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GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

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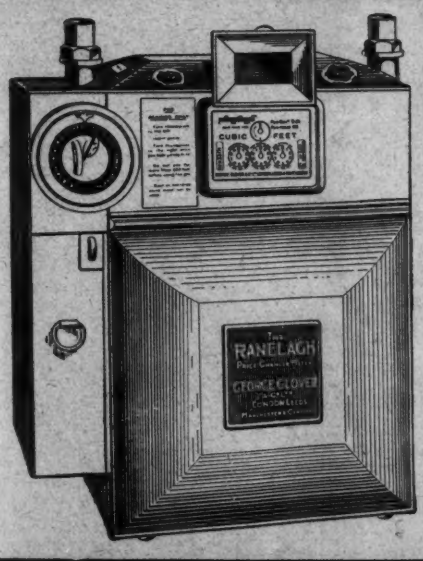

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EDITORIAL NOTES.

The Surplus Coke Problem.

THIS is an old problem. For a great number of years it was the cause of considerable vexation and troubling of spirit among the managements of gas undertakings. Many concerns with much coke to sell found themselves being undercut in their own trading province by other undertakings—some neighbours, some operating from a distance—also with a large surplus production. Feelings were in consequence not altogether pleasant. The war, short coal production, and the seven-hour day in the mines combined to make the conditions for the sale of coke—at home part of the period, and at home and abroad for another part—far more favourable. Then came the depression in home trade; and though there has been some improvement, matters industrially are still very far behind what would have been regarded as normal in the pre-war days. One result of this is that the old state of coke accumulations has again set in in some districts; while in others a fair trade is being done, and especially in those areas from which export can be readily made to the Continent, although not at the prices that a time ago made gas-works managers less favourably placed geographically envy exceedingly their more fortunate brethren.

Coke must not be allowed to sink again to the position of a drug in the market. The problem is, What is the best to be done in the circumstances? The Lancashire Commercial Section of the Manchester District Institution of Gas Engineers have attempted a solution; and they have formulated some proposals [p. 795] which commend themselves as being practical, and which have been approved by the Central Executive Board of the National Gas Council. This fact alone will ensure the recommendations being widely and seriously considered. A singular thing is that, when the industry was formerly suffering from a plethora of coke, and when dumping of the material from one undertaking into the districts of other undertakings was ruffling men's feelings, and causing them to say all manner of things that were more derogatory than polite (and perhaps to some extent justified), there was no taking counsel together over the matter with the view to exploring the avenues of possibility to ascertain whether some concrete scheme could not be fashioned which would ease the conditions, and improve the market. From the Manchester district, time and again, several proposals have come affecting other matters of concern to the industry; and now we have this scheme as to the disposal of surplus coke. It is a question that affects the whole of the industry; it is therefore one for co-operation. This is recognized by the scheme, which we publish in later columns.

Every engineer who is able to utilize coke for gas-making, every engineer who can develop his local sales, and every engineer who ships coke abroad, is doing something to relieve the home conditions in respect of this commodity. A surplus of production of any commodity in the home market means that the price is being, or will be, depressed. Coke is not the same as a product the output of which can be governed according to demand. The output is largely regulated by the demand for, and output of, another product. Therefore, in respect of coke, we are not with those people who say that it is highly immoral to do things that will maintain prices, instead of letting the law of supply and demand take its normal course in regard to price. Coke, too, has an intrinsic value—a value that should have relation to other fuels in respect of price. Some cokes have a calorific value higher than certain qualities of coals; and, therefore, we see no reason whatever why, because there is surplus production for home use, the price (if means can be found for utilizing or disposing of the surplus) should not have at least a parity with the price of fuels of corresponding calorific value. Hence the welcome given to the scheme from the Lancashire district. It is stated that in its working it is meeting with success in the area; and it is hoped by those putting it forward that the introduction to the District Executive Boards of the National Gas Council and the Commercial Sections of other District Associations will lead to its adoption, and thus co-ordination of effort in this respect, throughout the country. It is felt that such a course would be highly beneficial. We believe that it would be. Anyway, something must be done, and the sooner the better, having in view the growth of gas heating, which means in turn the growth of coke production, as at the moment there seems little prospect of the industry taking to water-gas making or complete gasification to an extent equal to the increasing output of gas for heating purposes. The absorption of the extra coke has to be legislated for in some way, and profitably; otherwise it needs no words to convince any man of intelligence that something will happen of an adverse nature to the revenue from this secondary product. The expansion of gas heating will be the impelling force to the gasification of more and more coke, if new markets cannot be found for it.

Let us examine the suggestions that have emanated from Manchester. Such examination does not disclose anything to which exception can be taken. On the contrary, the recommendations are sound. Perhaps the first one will not commend itself to those gas undertakings that have long been the exporters of coke. It proposes that all actual surplus coke in the district should be disposed of by shipment through the Coke Sub-Committee of the Lancashire Commercial Section of the Manchester District Institution of Gas Engineers. The scheme, as we have already indicated, is recommended to the consideration of gas undertakings throughout the country, with the view to adoption. Supposing that the "actual surplus" quantity of coke was pooled in each district of the country for shipment, the degree of absorption abroad would, of course, largely depend on the price; and the cost of transport would not be a particularly light one from some parts of the country. At the same time, it would financially affect the overseas market of those undertakings which have long been engaged in this business, and which have had two or three years of remarkable prosperity. The second suggestion is that the undertakings of towns that do not make sufficient coke to fill the requirements of their district should, from time to time, notify the Coke Sub Committee of the additional tonnage they can handle; and the Coke Sub-Committee would then place them in communication with the undertakings that have surplus for disposal. This is a systematic, and therefore far better, way of doing things than the arbitrary seeking for customers here, there, and everywhere, regardless of whether or not the local coke producers have surplus production. The sane way of dealing with this matter is more a question of co-operation than anything else. The idea of co-operation is enlarged in the third proposal. This suggests what is, of course, an essential of the scheme—that the surplus disclosed shall be notified to the District Sub-

Committee of the Commercial Section, who, in the first instance, will notify each undertaking of the towns where there is no surplus, and the make is not equal to the demand, when they could make suitable arrangements with the undertaking of such town direct, and dispose of coke at satisfactory prices. It is suggested that a margin of 6d. per ton should be allowed to cover the cost of disposal and supervision. This is moderate. An alternative, if preferred, is that neighbouring undertakings similarly situated could individually make their own arrangements on these lines, apprising the Coke Sub-Committee that they have done so. This appeals to us as a practical and sensible plan. Then any further surplus, being the actual surplus, could be pooled, and sold for shipment (as contemplated in the first place) through the Coke Sub-Committee of the Commercial Section. It seems to us that all gas undertakings would benefit from this methodical procedure; and, moreover, it would give a new interest in coke marketing which would have beneficial effects in greater efforts being made—at any rate, we hope so.

There is a danger. Some managements of gas undertakings do precious little in the way of endeavour to develop coke sales locally. It is to be hoped the scheme would not give them a new excuse for laziness and negligence. We believe much more could be done than is done in developing local coke sales. There should be a corresponding interest in this direction—we do not suggest the same detailed intensity—as there is in developing gas sales. The one is concomitant of the other. The scheme comprises suggestions in this connection. It urges every gas concern to take steps to increase local sales by every possible means—for example, by grading coke to suitable sizes for various classes of use, by deliveries in bags from 1 cwt. to a full load, by having a census made of all large and industrial users, with calls by representatives or inquiries made by letter as to their requirements, quoting special terms according to quantity and cost of delivery. We believe much more coke business might be done in the industrial world—especially for steam raising. But a study must be made of the methods of application to realize the best efficiency from the coke. It is because this has not been generally done that coke has been in some areas a product industrially despised. If it is dealt with properly, and not expected to function with a high efficiency under improper conditions—providing it is a coke with decent characteristics—it should obtain a new status in the industrial world.

Finally, the scheme includes two proposals that will meet certain criticisms that might be made. The first is that where a system of allowing a discount to local agents is in force, there is no objection to such being continued under special safeguards as to competition in price, or sales of outside coke; and where undertakings have supplied certain large users outside their own area over a period of years at special contract prices, they should be entitled to consider them as included in their own local and legitimate trade. The whole scheme appears to us to be a businesslike one—at all events, it has been put forward for the general good.

The Economics of Coke-Oven Gas for Town Supply.

The *pros* and *cons* as to the utilization of coke-oven gas for town supply do not lose any of their respective weights, or to such an extent that reason is so much heavier on the one side than the other that a policy of adoption or rejection can be accepted as being generally applicable to all cases. It cannot be. Whether it is wise to purchase coke-oven gas must depend upon the circumstances of every undertaking contemplating the step. The position in this regard is not becoming any better for the seller of coke-oven gas looked at from one point of view than it is for the buyer looked at from another point of view. Of course, as an economic proposition, it is not right that good combustible gas such as that from coke-ovens should go begging, when it could be piped to a community not far away, and be used for domestic and industrial purposes. That is the position looked at generally; but the community would consider that economically it was very wrong if they had to pay more for coke-oven gas than they could be supplied at from a local gas-manufacturing plant, or from a neighbouring larger works which could send them cheaply made gas at high pressure through a connecting main. Further, the same community would regard it also as very wrong if they were supplied from a source which was less reliable than the local gas-works. We judge things very much by standards in these times. The proneness to do this is increasing more and more; and this coke-oven gas question is one which must be judged by the standards provided by representative and relative costs and reliability.

In a paper that Mr. D. Muir, of Pontypridd, read at the meeting of the Wales and Monmouthshire Institution of Gas Engineers last Wednesday, he referred to these matters; and so did speakers in the discussion. The author showed conclusively that coke-oven gas supply for Pontypridd is a good proposition; but he warned all who heard, and all who will read, that what is good for his town might not be good in the circumstances of another town. This was sound, and it was discreet. He told us how Pontypridd has a contract based on a sliding-scale, under which the Council buy coke-oven gas of an average quality of 488 B.Th.U. at 1·4d. per therm, when the price of coal delivered is 20s. per ton; at 1·6d. per therm, when between 20s. and 25s.; 1·8d. per therm, when between 25s. and 30s.; and 2d. per therm when coal is at 30s. and over. That is a very good contract; but not all coke-oven owners would be prepared to supply gas at the prices named, unless they were persuaded that, upon the top of these prices, there are costs which have to be incurred by the gas suppliers, owing to the source of supply being coke-ovens, which are not noted for constancy through various causes which intrude into their operation. Mr. Muir, however, points out that, with the increasing use of the gas for town supply, and with coal at present figures, coke-oven proprietors may not be disposed to sell the gas at the prices they are now doing in certain cases. In all likelihood, said Mr. Muir, several gas undertakings who were fortunate enough to make contracts before the war at as low as 4d. per 1000 c.ft. will soon be faced with the necessity for entering into new contracts, and then doubtless the price will be much higher—so high, in fact, as to prevent a fresh contract being made. We should like to indicate to the owners of coke-oven plants that the trend of things in the gas industry places certain limitations upon their price-raising proposals. The Gas Regulation Act has lately stepped in; and it has introduced into the gas industry an elasticity in respect of gas production which it never before possessed, in that each undertaking can make that quality of gas which, in its special circumstances, is the most economical. This is an advantage to coke-ovens in the disposal of their gas; but it is also a disadvantage in that every undertaking working under the Act has a larger basis upon and from which to discuss the respective merits of purchasing gas from coke-ovens, or to manufacture with their own plant under those conditions that will give them the best possible benefit.

The author of the paper and the speakers in the discussion all pointed out that the bare cost of the coke-oven gas at per therm or per 1000 c.ft. is not the actual cost to the gas undertaking, owing to the special conditions involved. A stand-by plant has to be kept in readiness to meet any cessation of supply from the coke-ovens, and this plant has to be equal to the coke-oven supply and to peak loads, unless there is an agreed maximum limit. This means that capital and maintenance costs for the stand-by plant have to be added to the price paid for the coke-oven gas; it also means that a stock of coal has to be kept, and here again working capital is lying idle; and then there must be at hand men capable of entering the retort-house, or operating a water-gas or complete-gasification plant, should there be a cessation of supply from the coking plant. The cost of the coke-oven gas—it is well to be emphatic regarding this—does not constitute the whole of the charges due to changing from the normal modes of gas provision. Those responsible for town-gas supplies know the importance of their obligations; the owners of coking plants are aware of how susceptible, through labour conditions, are their coke-ovens as sources of gas supply for urban purposes. Hence the need for the stand-by plant on a gas-works which engages to take a supply of coke-oven gas. Mr. Muir in his paper, the President (Mr. Octavius Thomas), Mr. W. H. Johns, Mr. J. H. Canning, and others in the discussion, all pointed to the importance of reliability in the source of gas supply, which reliability is a matter of value to town-gas suppliers. It must never be overlooked by them. The coal stoppage of 1921 is too near to have vanished from memory. In these times there is agitation in the House of Commons, in the Press, and at meetings, regarding the lower paid men in the mining industry; and there is talk in some coal areas of ending the agreement, which provides for the sharing of surplus profits over and above the fixed profits and mini-

mum wages of the mine workers. One can see the unrest; and until some scheme is applied that will remove—or largely so—the uncertainties in the coal industry, and therefore the coking industry, gas administrators cannot contemplate a price for coke-oven gas that would not give them a good margin for assuring their position in the event of labour trouble in the mining industry, taking into consideration, too, the greater latitude they have under the Gas Regulation Act in operating within their own works to the economic advantage of both themselves and their consumers. At the same time, Mr. Muir shows that coking plant as a source of gas purchase is worth considering in some instances, providing price and available quantities are right, and the quality is constant. He supplies hints on these points which his experience suggests.

The paper is a good one; and it will probably stimulate other gas-works managements with a supply of coke-oven gas available to investigate the position to ascertain whether there is profit in it for themselves and their consumers. But the owners of coking plant will pay particular heed to what has been said on the question of price. They will see that their growing ideas as to the value of the gas may not come within the limits of what is politic in current conditions from the point of view of the gas supplier.

The Exhibitions Ahead.

MUCH time has passed since the gas industry had any truly representative exhibitions. Thoughts have been occupied with other matters, in which a ghastly war, and men, materials, money, and heavy prices have all had part. The combination of circumstances for a time prevented permanent expansion in gas business, though munition needs provided some little compensation for losses of consumption in other directions. The industry has been setting its manufacturing houses in order—making amends as far as possible for the compulsory neglect of recent years. Money is easier, men are available, and materials and goods have fallen in price—though not to the levels that obtained before the war. The Gas Regulation Act has come, conferring greater liberties in respect of the economical production of gas as directed by local circumstances. Normal gas consumption has returned and has increased, except in those industries where trade is not at high-water mark. A greater activity at both the producing and sales ends has taken possession of the industry. Never before has there been such enthusiasm at the trading end as at present. The time is ripe for using every means for producing more and more development. Our competitors—the electricity purveyors and the coal merchants—are busy. Over both we have advantages. Electricity cannot compete with gas for heating purposes on a cost basis; domestic coal is still some 70 to 80 p.ct. above pre-war prices delivered in the south, its use entails the pollution of the atmosphere and much labour and dirt in the house, and it has a low efficiency. We repeat the time is ripe for extended development efforts on the part of the gas industry.

This is recognized; and now in the Midlands we are to have a National Gas Exhibition from Sept. 17 to Oct. 3 next. The gas undertakings in the Midlands will see to the success of this. They have appointed a strong Executive Committee, with Sub-Committees to look after the various branches of the demonstration that is to be made. At the head of the Committee is Mr. Alderman J. H. Lloyd, M.A., the President of the British Commercial Gas Association, the Deputy-Chairman is Mr. A. W. Smith, the General Manager and Secretary of the Birmingham Corporation Gas Department, and the Hon. Secretary is Mr. R. J. Rogers, the Fittings Superintendent of the Department. These names give us complete confidence as to the success that will attend the display, both in respect of organization and actual demonstration.

Then there is the British Empire Exhibition next year. Gas is going to be there; it must be there. Its representation must be strong on the side of the applications of gas. A special movement has been initiated by the Electrical Development Association to obtain for electrical applications a big representation and demonstration. The electrical plant makers were among the first to book space in the engineering section; and they have arranged and are developing their plans on a magnificent scale. Then there was the question of domestic and industrial electrical applications; and the information is published that the framework of the plans for the demonstration of these are well advanced. Literature on the subject is already in circulation; and publicity propaganda has started. The opening paragraphs of our "Electricity Supply Memoranda" this week will give indication of the ambition for a substantial and impressive display that the electrical promoters have developed. The gas industry will not desire to do anything less in this respect than the electricity supply industry, which, by the way, has during the past twelve months or so been very busy with local exhibitions. The expansion of the uses of gas is fundamental to the greater prosperity of every section of the industry—gas suppliers, plant makers, and the producers of the goods for utilizing gas. This must not be overlooked.

Pension Schemes for Small Gas Undertakings.

ONE cannot help having a great deal of sympathy with the subject-matter of the paper read by Mr. F. G. Kingwell, the Secretary of the Falmouth Gas Company, at the last meeting of the Cornish Association of Gas Managers. It describes a scheme, as applied at Falmouth, for providing pensions for the staff of a small gas undertaking. Most substantial undertakings nowadays have pension schemes for their employees; and, in these days, there is no occasion to defend the policy, or the correctness of the principle. The employers know well enough that provision of the kind is the right thing; if they are wise, they realize that such schemes provide links that have a binding effect between the employees and the concern; and, as Mr. Kingwell points out, they also assist in preserving that continuity of service which is of importance, always providing the man is competent for his job, and of good character. From the employee's point of view, the pension scheme enables him to face the future with greater assurance and equanimity. When time brings about physical infirmities and incapacitates him for his work, and his efficiency is not that of a younger man, he knows that he will have something to which to look forward which will not leave him at the mercy of the world and the pittance allowed him by the State at a late period of life. Some men, of course, are thrifty; others are not. But no matter how thrifty a working man may be, if a married man with a family, his wages do not as a rule contain in them—especially in these times—much, if any, margin to place in reserve for the closing years of his life.

We know that in the matter of rent and in the cost of living, men employed in small gas undertakings are better off than those employed in some of the large congested cities and towns; and their days are spent in healthier surroundings. But probably under the principle of zoning and grading their incomes are not so large as those of the men employed in the bigger undertakings. Be this as it may, when these men reflect upon the future, they must be somewhat envious of those men who are employed by the large undertakings, and who have membership in a pension fund. Mr. Kingwell's paper tells us, if not in direct words, by example, that such a condition of things need not exist—that though the large concern is in a strong position, there is no material reason why there should be any differentiation between a large and a small undertaking in respect of the provision of a pension. In fact, he thinks it should be imperative by law for every employer to provide for old age in the case of faithful employees. We are not sure that we should care to go so far as to be in complete agreement with him in this, unless it was made conditional in various respects. The fund should be a contributory one to which both employers and employees should subscribe. It is contributory in the Falmouth case. This is essential, because otherwise we can see the fund in some instances being made the excuse for ignoring the claims of thrift. One reason why we should be opposed to "every employer" being compelled by law to provide for the old age of his employees is that conditions of service are so widely different—not in the case of gas undertakings, and large concerns such as banking and insurance corporations, but as between such enterprises and small private firms, in connection with which salaries, commissions, and other emoluments are frequently paid which should enable the employees to make provision for the future, assuming nothing untoward happens. Where this condition exists, it would be unfair to the employer to place upon him legal compulsion in respect of a pension; and if this meant a revision of the conditions of service, there are many employees who would prefer the *status quo*. However, with the reservation that

we are not in agreement with Mr. Kingwell as to making a pension fund a general legal obligation upon employers, other than under defined conditions (outside which such funds should be voluntary, and not obligatory), we are in total accord with him that there is no reason, as he so admirably shows, why such funds should not be established in small gas undertakings, as well as in large ones. They have such a beneficial influence that they should be part of the policy and system of every concern, just as is any other existing feature or part.

The scheme as adopted at Falmouth is not put forward as a model for adoption in all cases; it is only submitted by Mr. Kingwell to show the way the Falmouth Gas Company have chosen to institute and work a scheme. It has been established through an insurance company. The author of the paper finds several advantages in this course—one being the absolute guarantee that every liability will be promptly met; and simplicity is a strong recommendation. The details of the scheme are given; and they will be studied with interest by the responsible officials of the smaller gas undertakings who have not yet introduced a pension scheme. Other small undertakings may prefer a different course from that pursued by the Falmouth Company. The main point is that a pension scheme is a valuable institution not only for large but for small gas undertakings; and the advice that there should be adoption by the latter is sound from every point of view.

Professional Distinctions.

In his Presidential Address to the Society of Chemical Industry last week, Dr. E. F. Armstrong, F.R.S., submitted a proposal which we do not think is likely to have much, if any, success. He suggests that the time has come when steps should be taken to bring about a gradual confederation of chemical societies. Chemists, and others interested in chemistry, would become members in the first place of the confederation, and in the second of a particular society or section. The government would be in the hands of a Grand Council, chosen in part from the members, and in part by the sections. Each constituent society would continue to devote themselves to the particular branch of the subject with which they had been associated in the past, but all overlapping would be entirely eliminated. The inspiring object of the scheme, it seems, is to raise the status of those chemists who are fully qualified—to place them far above all others in the ranks of chemistry, and to give to the place they occupy special significance and recognition. It must not be forgotten that anything which does this for one part of the men in the ranks has the reverse effect upon others who are also in the ranks; the one part being raised head and shoulders above the others, the latter recede in position farther than before. Owing to this, we think Dr. Armstrong's scheme will fail through opposition. Only recently during the therm charges inquiry certain scientific bodies sought to make the gas examinerships a preserve for their own members; but in this they were unsuccessful. There are other men who are quite competent for the work who do not boast the "tail-light" of "F.I.C." Not that we would speak disparagingly of these proofs of qualification by examination; and we should regret to see such distinctions done away with. But there are men who succeed in examinations who have not high qualifications: there are others who do not pass who have.

However, in the confederation, the Institute of Chemistry would continue to act as the examining body, and maintain a register of fellows and associates, who alone would be entitled to the professional descriptions of "F.I.C." and "A.I.C." All others would be simply members, who would be prohibited from using any professional distinction. We agree with Dr. Armstrong that the custom is unnecessary of employing (for instance) such letters as "F.C.S.," seeing that they have no meaning as a qualification in the professional sense. On the other hand, we know of chemists who have the right to the distinction of "F.I.C." who have made some formidable blunders from the practical point of view. Just imagine, for example, a highly qualified chemist advocating in season and out of season the transfer of the whole of the gas-producing operations of the gas industry to the low-temperature system *per se*. Professional distinctions do not always attest the practicability of recommendations. There are in such cases other qualifications that are desirable and, in fact, indispensable. Such men may do just as much harm and mischief as the unqualified and the incompetent—perhaps more in some cases, because men may believe in them until too late. But of this Dr. Armstrong did not speak, though he did of the "harm and the "mischief" which are being done to-day by unqualified and incompetent persons who style themselves "chemists." Let us make it clear that we are not opposed to examinations as a test of qualification—up to a point. Our preference is for some system which would show degrees of qualification by examination; so that those who can climb (though pecuniary and other circumstances be against them) may do so, and be encouraged by some distinction as they progress. We prefer distinctions by examination rather than by subscription, because there is no better way than examination of ascertaining the possession of knowledge, other than by a man's work, which may mean the flow of much time. Nevertheless, we are not prepared to say that examinations alone are a test or a guarantee of the complete attributes that are requisite in a professional man. Of that there is abundant proof.

But to the main point. Dr. Armstrong suggested that a Committee should be appointed by the Councils of all the Societies concerned, with the view to study forthwith the desirability and practicability of federating the Chemical Societies. The scheme may partially mature, but, we think it may be said with some amount of confidence, never completely.

Miners' Wages Agreement.

Last Thursday evening, the miners' leaders submitted their case in the House of Commons on behalf of the Minimum Wage Amendment Bill, the second reading of which was moved by Mr. Adamson. It was soon apparent that there is in the House a strong feeling against putting an end to the settlement arrived at in 1921; and it is frankly acknowledged that the Bill is an alternative to determining the agreement. Stated briefly, the miners' proposal in the Amendment Bill is to add 74 p.ct. (representing the increased cost of living) to the varying rates of minimum wages fixed under the Act of 1912. It appears to be generally accepted that the proposal would mean an addition of £12 500,000 a year to the wages of the miners. The vision of their leaders is that the coalowners could make up this sum by the better organization of the industry, and by eliminating certain intermediate profits of distribution. Mr. J. C. Gould and the President of the Board of Trade (Sir Philip Lloyd-Greame) considered that the owners have every inducement under the existing agreement to reduce working expenses as far as possible; and they showed that, even if 25 p.ct. reduction in distribution costs were obtained on the 38 million tons of domestic coal, it would only add 4d. per ton to the miners' wages. Another objection to the Bill is that it would absorb much more than the divisible profits under the agreement, of which last year the owners obtained only 7 p.ct. and the men 93 p.ct. In fact, on the basis of the Bill, wages last year would have absorbed 110 p.ct. of the divisible profits! It would also lead to the closing of the weaker pits, and so raise the unemployment rate in the industry, which is now only 3 p.ct. No other industry, except perhaps public utility concerns, can boast such a low rate of unemployment. The Government resisted the Bill in the interests of the trading community and of the consumers, out of whose pockets the large extra sum of 12½ millions required by the Bill would have to come. Of that there is little doubt. While everybody regrets that in some districts miners' wages are low, in many other industries the workers' wages are lower still, and unemployment is greater. The Bill was rejected by 230 votes to 154.

The National Coal Resources.

One of the main functions of the Fuel Research Board is a survey and classification of the coal seams in the various mining districts by means of chemical and physical tests in the laboratory, supplemented where desirable by large scale tests at H.M. Fuel Research Station or elsewhere. The Board consider that the best way to carry out this work is by local committees, the personnel of which would include colliery owners, managers, representatives of the Fuel Research Board and of the Geological Survey of Great Britain, as well as of outside scientific interests. Each of the Committees would be charged with the duty of superintending the work of the survey in a coal-mining area; and through this the survey would become from the commencement of practical value, since local knowledge and

experience would be made available, and the selection of seams would be decided by those most likely to estimate correctly the relative importance of the problems to be solved. The seams selected would undergo physical and chemical examination by the local experts, after which a final selection would be made of those likely to justify experiments on a practical scale to test their suitability for particular uses or methods of treatment. The first of these Committees has now been actively at work in the Lancashire and Cheshire area for nearly eighteen months; and the Board have recently appointed a Committee to deal with the survey in the South Yorkshire area. The South Yorkshire Coal Trade Association and the Midland Institute of Mining, Civil, and Mechanical Engineers are co-operating in the work. The composition of the Committee is as follows: Mr. J. Brass, Mr. Robert Clive (Hon. Secretary), and Mr. H. Danby, representing the South Yorkshire Coal Trade Association; Lieut.-Col. H. Rhodes, M.Inst.C.E., M.I.Min.E., F.S.I., representing the Midland Institute of Mining, Civil, and Mechanical Engineers; Prof. R. V. Wheeler, D.Sc.; Dr. C. H. Lander, Assoc.M.Inst.C.E., Director of Fuel Research (Chairman *pro tem.*), representing the Fuel Research Board; and Dr. Walcot Gibson, representing the Geological Survey of Great Britain.

Gas and Other Coal Exports.

The total quantity of coal exported in May was 7,684,405 tons of a value of £10,588,417. In May last year the quantity was 5,057,230 tons; while in May, 1921, when we had little to spare, 14,066 tons left these shores—principally steam and gas. In the five months of this year, 33,220,230 tons have been sent abroad, of an estimated value of £41,464,651. How brisk the export coal business has been is seen by comparison with last year, when in the same period 22,390,312 tons were shipped; so that nearly 11 million tons more have been disposed of abroad so far this year. Of the total exported last month, 903,876 tons were classified as gas coal, with a value attached of £1,168,485—equal to an average of £1 5s. 1·25d. In May, 1922, 729,274 tons of gas coal were shipped; the value being £816,885. In the five months of the year, the quantity of gas coal sent abroad was 3,923,019 tons; the value being £4,704,620. In the corresponding period of 1922, 3,185,595 tons were exported, of a value of £3,543,705.

Gas Coke Shipments.

The returns under this head will have a special interest in view of the scheme referred to in the first editorial article in this issue. The trade in gas coke abroad is growing. Last month it was 63,333 tons; and the value was £100,448, or an average of £1 11s. 8·6d. per ton. The quantity exported in May, 1922, was 23,742 tons, with a value attached of £33,049. In the first five months of this year, 446,771 tons were exported, of a value of £667,432. In the corresponding period of 1922, 293,350 tons of gas coke were exported; the value being £442,456. In the five months ending May, 1921, 217,603 tons were shipped; the value being £562,383. The figures show an enlarged demand for gas coke from countries abroad; but, of course, the circumstances of fuel supply on the Continent have been abnormal this year.

Wages in the Engineering Trades.

There is not much peace in the engineering trades in these times; indeed, there now seems little to choose between the frequency of the wants of the engineering unions and of those in the mining industry. It is reported that the unions belonging to the Federation of Engineering and Shipbuilding Trades have decided to make application to the engineering employers for the stabilization of wages and the consolidation of existing rates, including the balance of 10s. per week still remaining of the war bonus of 26s. 6d.. The Unions are asking for a conference to discuss the application. What will be the attitude of the Amalgamated Engineering Union (who are not in the Federation) is not yet known. It is considered by the Unions that the time is now ripe for the application in view of the signs of trade revival. The shipbuilding section of the Federation propose to apply at the earliest convenient opportunity for an increase of 10s. per week; but, it is understood, they are not likely to make the application immediately in view of the slump still existing in shipbuilding. Unlike the engineers, the workers in the shipbuilding industry have lost the whole of the war bonus.

PERSONAL.

The new Chair of Chemical Engineering at University College in the University of London, which has been established as a memorial to the late Sir William Ramsay, has been filled by the appointment of Mr. E. C. WILLIAMS, M.Sc., F.I.C. For the last two years, Mr. Williams has been on Prof. Cobb's staff in the Department of Coal Gas and Fuel Industries in the University of Leeds, as Research Chemist to the Joint Benzole Research Committee of the National Benzole Association and the University. Before that time he had obtained works' experience with the British Dyestuffs Corporation, following on war service and a brilliant student career at the University of Manchester.

Dr. E. F. ARMSTRONG, F.R.S., has been re-elected President of the Society of Chemical Industry.

Mr. W. J. LIBERTY has been elected a member of the Camberwell Board of Guardians, having defeated the Socialist ex-Mayor in the Labour Ward at a bye-election by a majority of 176. Mr. Liberty ran on the Anti-Socialist ticket; the whole of the ward being labour.

Congratulations to Mr. A. J. BROADBERRY—who represents Messrs. Alder and Mackay, Ltd., in the South of England, and who is the second son of Mr. A. E Broadberry, of Tottenham—on his marriage, on the 20th inst., at Shustoke, Warwickshire, to Marie St. Johnston, only daughter of Mr. and Mrs. Wilkinson, of Hollyland, Shustoke.

On Friday, June 22, Mr. JOHN F. ROBSON, an old and esteemed official of the Newcastle and Gateshead Gas Company, completed fifty years' association with the Company. It has been a long and an honourable service, during which Mr. Robson has made many friends among all sections of the concern. He commenced work at the old offices in Neville Street, Newcastle, on June 23, 1873, and in 1874 was transferred to the branch office in Wellington Street, Gateshead. Five years later he was promoted to the position of rental clerk and collector in the chief office in Newcastle. In 1899 he returned to the Gateshead branch as Manager, which position he still retains.

Mr. E. W. PETTER, the newly-elected President of the British Engineers' Association, is a well-known figure in the engineering world. As Chairman of Messrs. Petters, Limited, Yeovil, and Managing-Director of Messrs. Vickers-Petters, Ipswich, he is a recognized authority on everything appertaining to the theory, construction, and practice of internal-combustion engines. In politics a conservative, he contested, though unsuccessfully, North Bristol, as an independent conservative in 1918. Mr. Petter has always taken a special interest in the questions at issue between employer and employed, and has written largely on the subject. Although himself an employer, his sympathies with labour are widely known. Cultured, well-read, and gifted with keen powers of observation, he has travelled in many parts of the world. His views on most subjects merit, therefore, close attention, more especially where they touch upon the industrial questions of the day. As President of the British Engineers' Association, which is organizing the Engineering Section of the British Empire Exhibition, and which, moreover, will play an important part in the forthcoming economic conference with the Dominions, Mr. Petter may safely be trusted to make his period of office a notable one in the history of the Association.

Industrial Uses of Gas in America.—An interesting comparison has, says the "American Gas Journal," been drawn of the distribution of the consumption of gas in the United States, twelve years ago and to day. It is stated that twelve years ago 45 p.ct. of the gas consumed was used for illumination, 50 p.ct. for domestic uses other than illumination—as, for example, cooking, hot water heating, &c.—and the remaining 5 p.ct. for industrial and unclassified uses. To-day it is estimated that 21 p.ct. of the entire consumption of gas in the United States is for illumination, 54 p.ct. for domestic purposes other than illumination, and 25 p.ct. for industrial and unclassified uses. This means an increase of 500 p.ct. in the consumption of gas for industrial purposes.

Provan Chemical Works.—The first instalment of the full and well-illustrated description of the Provan Chemical Works of the Glasgow Corporation appears in the current issue of "Engineering." This chemical department, which is run as a separate organization to the gas department, is under the charge of Mr. W. A. Walmsley, B.Sc. At all the four gas-works of the Corporation, the simple operations of tar distilling and extraction of sulphate of ammonia are continued; but new plant has been installed at Provan where all the operations connected with the refining of the crude materials are concentrated. As a matter of fact, our contemporary adds, these chemical works ranks as one of the most completely equipped for the recovery of bye-products and derivatives, and their purification, which have been put down in this country. The works may be considered as comprising three sections—sulphate of ammonia, tar distilling, and the production and separation of the valuable derivatives from the tar. The ammonia plant, which occupies a position between the other two, was designed by Mr. Walmsley, with the collaboration of Messrs. Ernest Scott & Co., Ltd., who carried out all the erection work. There are two independent units, each of suitable capacity to deal with 70,000 gallons of 1 p.ct. ammoniacal liquor per day.

ELECTRICITY SUPPLY MEMORANDA.

THE information that was published some time since in the "Memoranda" showed that the electrical plant manufacturers, through their organization the "B.E A.M.A.," intend to make a magnificent display at the British Empire Exhibition. But there has been some doubt as to whether this alone would have any great beneficial effect on the electricity supply industry. The public stop and admire plant of this character; but they are not made very wise by an inspection as to what it all means and the purposes of the different elements. They know generally that the plant is for generating electricity; but their knowledge is infinitesimally increased by what they see. The British Electrical Development Association have had an inspiration, which has developed into an aspiration. They are maturing a scheme for the holding, in a prominent position in the Electrical Section, of a general display of the applications of electrical energy; and this, according to the plans, is to occupy some 10,000 sq. ft. The idea is to organize this on behalf of the municipal and company owned electricity undertakings of the country, which, of course, it is expected, will share the cost. Unless the "Electrical Review" has put a large amount of imagination into the proposal, the exhibit is to be a very comprehensive one; and the impressions it will make will, it is anticipated by the promoters, inure to a bulky demand for electrical current for all domestic purposes. Anyway, that is the hope and the wish.

Electrical Applications at Wembley.

There is no doubt that we have interpreted our contemporary accurately. It tells its readers that domestic and small power electrical applications will be arranged to produce a general effect which will make an "abiding mental association of electrical progress with ease and comfort." That is the proper way to do things; but whether or not it will carry conviction to "hundreds of thousands of visitors" as to the "social and industrial advantages that electricity can bestow," time, and not anticipation, must decide. However, electrical service is to be shown in abundant detail; but it is felt by our contemporary that to carry out the conception to perfection will call for the co-operation of the plain, practical man and the imaginative genius. The goal is the education and instruction of the user or potential user of electricity; but while the scope of the display is indicated in such ornate language, the scope of the education and instruction of the user is not stated. One does not know whether he will be told the cost of the appliances that he will see, the expense of their installation, and the running and maintenance costs. Further, we are not informed whether he will be told anything as to the time expenditure in respect of water heating, the cost of heating by electric fires, and the several things he must or must not do if electric cooking is to be kept within the compass of his purse. What he is to do when current fails should certainly be included in the instruction. A good many people have found it advisable to keep oil-lamps trimmed, or a stock of candles handy. Education and instruction should be comprehensive in the interests of the individual and of national economy in conserving our coal supplies. However, the best productions of "all" makers will be presented in "one place." That is a pity, for two reasons—the best are costly, and if they are "all" to be presented in one place, the display will look like a storehouse rather than an attractive demonstration. By the exposure of the electrical appliances and devices, it is hoped that the service these can render will be immediately understood by the lay mind. It is proposed to have an electric restaurant which will be so designed as to show visitors the whole process of cookery carried out under ideal conditions.

An Abiding Mental Association of Progress.

That is the scheme, with its great ambition and extent. But an indispensable condition to ensuring it maturing is that electricity supply companies and municipalities shall find the wherewithal to bring it together. It is frankly stated that many thousands of pounds will be needed to make the exhibit the "talk of all the cities and towns of the country"—in short, the desire is to arouse "the national curiosity and interest." It is thought that funds usually devoted to advertising the resources of districts should, for the time being, be diverted to the general display at Wembley. The point, it is hoped, will be fully considered by councils who are anxious to bring home to the manufacturing community and to the public generally the cheap power and other industrial and residential facilities claimed for their areas. Our contemporary appears to be somewhat concerned as to whether municipal undertakings will contribute luxuriantly, as it is careful to impress on them that there need be no questions as to the legality of their action in view of the power conferred by section 30 of the Electricity Supply Act, 1919. It is believed, however, that electricity supply companies, enjoying as they are [of course, our contemporary should have said "some of them"] a period of prosperity, will come forward handsomely with funds to "invest in an undertaking which will bring them still larger profits from a resulting accelerated rate of increase in demand for electricity for all purposes." Our contemporary has said much as to what is in view; but it announces that the details will be elaborated in due course. We should have thought there was little more to be said.

The First Essential.

For many years, tendering for electrical installations has disclosed some remarkable divergencies in prices. No clear explanation has ever been given as to why this should be, when the tenders are all based upon the same specification. Whether it is due to some tenderers wanting an undue profit, or to others finding some allurement in the bankruptcy court, we cannot say; but the fact remains that it is not unusual to see differences of 100 p.ct. (sometimes more) between the highest and the lowest tenders. "Megohm" in the "Electrical Times" calls attention to the tenders for wiring the North-Western Hospital of the Metropolitan Asylums Board. Twenty-two authorities put in prices; and these had gradations from £1660 to £3666. Six of the tenders came to between £1660 and £2000; seven, between £2000 and £2500; five, between £2500 and £3000; and four were above £3000. "Megohm" thinks these differences require elucidation. Perhaps so; but no doubt there are some of the contractors who would rather not help in the elucidation.

Installation Tendering.

Some writers in the newspapers are enough to make gas men blush with their praise; others are enough to drive them into an early grave, or a very bad temper. Some are insolent and slanderous, and distort facts beyond recognition. But there are those who say nice things and mean them. In the case we have before us, what is said is truthful, if somewhat elaborately expressed. It is "Paul Bewsher" who, writing in the "Evening News," tells us that to ride up the Edgware Road from the Marble Arch after nightfall is to pass along an avenue of silver and gold. On the pavement at the right of the roadway is a line of electric-lamps—gleaming gold. On the left is a line of incandescent gas-lamps—shining silver. Electricians reading this will become inflated, until they learn that gas light works an enchantment which electric light does not. "There is an air of mystery, an atmosphere of romance in a street lit by incandescent lamps." There is more that dresses gas light in such a good character that people might be pardoned for thinking it was extravagant, were they not themselves impressed by experience with the truth. "A gas-lit London street at night is entirely different from that same street by day. . . . A London street lit by electricity is at night, however, merely the same street as it is at noon—garishly illuminated by a hard mechanical glare, instead of daylight." And the writer has noticed that it is far less tiring to walk down gas-lit streets than it is to walk down those where lifeless electric lamps burn. He may be right; but one had not noticed the phenomenon. In the latter case, too, the pavements seem harder—the streets unfriendlier. Gas-lamps are companionable; they can be sympathetic. And Paul Bewsher would hate to have been born in an age when electric light was everywhere over London at night. After this there should be no more thought of adopting electricity in the streets. Psychological effects should now be strong determining factors in the adoption of the method of street lighting.

Psychological Effects of Street Lighting.

We called attention the other week to the electric panel and tubular systems of heating, to which were ascribed remarkable effects in the distribution of warmth though the consumed electrical energy, and therefore the potential heat given off, is materially lower than would be the case with an ordinary electric fire. Now there is another claimant to consideration. It is the Lightfoot tubular electric system. From the "Electrical Times," we learn that heat is conveyed and distributed throughout the whole of a room in exactly the same way as with water-pipe systems. So satisfactory have been the results, that it is asserted the system will effectively heat the whole of a room with a saving of 50 to 60 p.ct., compared with the results obtained with any electric radiator of the convected heat or glow type. The report states—we think foolishly—that the firm guarantee, with a consumption of 0·6 watt per cubic foot, to give a temperature of not less than 60° Fahr. over the whole of the room, walls, ceiling, &c. Now it does not state what is the starting temperature—what is the atmospheric temperature, and what is the temperature of the walls, ceiling, &c. The statement infers that the expenditure of energy will be the same, no matter the temperature conditions. The consumption cannot be the same, with such low-temperature heating systems, for all degrees of atmospheric temperature, unless a fearfully long time is taken in raising the temperature. According to the atmospheric temperature, so the intensity of the struggle between it and the means of artificial heating increases or decreases. But apparently it did not occur to the writer to consider what 0·6 watt per cubic foot means. One watt is equal to 3·42 B.Th.U.; therefore 0·6 watt would be equal to 2·052 B.Th.U. One B.Th.U. will raise 1 lb. of water 1° Fahr.! What will the expenditure spread over an hour of 2·052 B.Th.U. do to 1 cubic foot in a room of 2000 c.ft. capacity, with the air constantly undergoing change? The writer says: "For example, a room of 2000 c.ft. capacity would be warmed throughout to the minimum temperature of 60° Fahr., by a consumption of 1·2 units per hour." By what miracle is there sufficient heat

The Tubular System of Heating.

for the work when the days are cold? But more wonderful still is this: After the initial heating, the loading (so we are told) may be reduced to about 0·4 watt per cubic foot. The writer must be talking of a hermetically sealed box.

The Remuneration and the Work.

An article in the "Electrical Times" is headed "Municipal Electrical Development—A Word with Town Councillors." But the theme is not so much municipal electrical development, as the development of the municipal electrical engineer's salary, in view of the high technical and commercial qualifications that he should possess. Of course, every man is worthy of his hire, though many municipal councillors have a very poor conception as to what should be the measure of the hire. Gas engineers, too, require high technical and commercial qualifications, and technically of a more complex character than electrical engineers. They have to be gas engineers and chemists, and some of them electrical engineers, and there has to be more than a nodding acquaintance with other branches of engineering. Even so, the same hesitation is found—not in all municipal bodies, but in some—properly to make remuneration commensurate with qualification, duties, and responsibilities. Our contemporary is of the opinion that the immediate need is to examine the development of municipal electricity supply as a work of national importance, and to accelerate the development by linking it up unmistakably with the remuneration of the engineer. Unless some change be made, there is a danger that municipal service will in future attract the second-rate, unenterprising, routine-following type, whose highest ambition is to obtain a safe job, with a pension attached. Such mediocrities are no good to any industry. But our contemporary seems to forget that the electricity industry is drifting to centralized generation, and that the day is expected when wanted highly qualified electrical engineers will be fewer in number; and that local distributing engineers and sales managers will fill the bill for local operations. When the national importance of the electrical engineer is considered, it must not be overlooked, too, that of equal, and perhaps greater, importance to the nation is the gas engineer. The writer of the article asserts that it is "self-evident that the universal use of electricity for light, power, heat, traction, and the other diversified functions of which it is capable, means smokeless skies, clean cities, cheaper production, labour-saving homes, swift transit, improved health, more wealth, more leisure, and generally happier and longer lives. The development of electricity is the development of civilization." This is wonderful; but what a vast amount of public inappreciation there is, judging by the fraction of use that is made of electricity for certain of these purposes. It is of national importance that some of the uses for which electrical men prefer claims for their commodity should not be developed, for the simple reason that there are more economical ways of effecting the same ends. With the proposals that good men should be well paid we are in total sympathy.

SCOTTISH JUNIOR GAS ASSOCIATION.

(EASTERN DISTRICT.)

The annual excursion of the Association took place on Saturday, June 16. In the forenoon the members visited the works of the St. Andrews Gas Company. Mr. GEORGE BRUCE, Engineer and Manager, welcomed the visitors, and conducted them over the works.

ST. ANDREWS GAS-WORKS.

The retort-house contains four benches of six horizontal retorts. There is storage for 1000 tons of coal. Two Bryan-Donkin exhausters of capacities of 25,000 c.ft. and 10,000 c.ft. per hour are installed. A Livesey washer, Holmes washer-scrubber, and sulphate plant (Pettigrew) are also in use. The water-gas plant (Humphreys and Glasgow) is highly satisfactory. The output per annum is about 66 millions; but it is expected that this will be exceeded this year.

The members, numbering about forty, were entertained to lunch; and in the afternoon some participated in a golfing competition on the famous Eden Course, while the others indulged in recreation on the putting and bowling greens.

In the course of the evening,

Mr. W. A. DEARDEN (President of the Association) conveyed to Mr. Bruce the thanks of the members for the hospitality extended to them, and for the admirable arrangements which had been made to provide interest and enjoyment.

Mr. BRUCE said it had been a great pleasure to welcome the Juniors, and expressed the wish that a return visit would be made at no far distant date.

Saved by a Gas-Main.—Whenever a slight inconvenience is caused by the gas industry, much is heard about it. It is therefore interesting to read an account of how nearly a hundred citizens of London (Ont.) escaped death narrowly, and owe their lives to the maligned gas-main. As a street car was passing over the Eidout street bridge, a large steel supporting girder collapsed; and but for the substantial gas-main, the occupants of the car would have been deposited in the river.

PRESENTATION TO DR. CARPENTER.

The Medal of the Society of Chemical Industry.

The Annual Meeting of the Society of Chemical Industry was held at Cambridge last week, under the presidency of Dr. E. F. ARMSTRONG, F.R.S., some extracts from whose Presidential Address are given in another column. At the sitting on Friday there was a presentation of the Society's Medal to Dr. C. C. Carpenter, C.B.E.

The PRESIDENT, in the first place, expressed his very great regret that, at a late hour on the previous night, a messenger had arrived from London with a letter from Dr. Carpenter (the President of the South Metropolitan Gas Company), who regretted that he was unable to come to Cambridge to receive the Society's Medal, and to deliver his address to the members. He had, however, sent the notes which he had intended to use as the basis of his address. The Council felt certain that the reasons which had prevented Dr. Carpenter from coming to Cambridge must have been of grave import. In explaining what the Society's Medal was, the President said it was a medal awarded to a scientist who had contributed either to the advancement of science or to that of the Society. It was first instituted in 1896, when it was awarded to Mr. Glover, of sulphuric acid fame. Their old friend and Past-President, Dr. Perkin, was the next recipient; and in succeeding years it was awarded to other eminent scientists and chemists, both at home and abroad. With regard to Dr. Carpenter, he was so well known that any remarks one could make about him at that meeting were in the nature of gilding the lily. Dr. Carpenter had joined the Society thirty years ago. Essentially, he was an engineer, and, like many engineers, he was early attracted to chemistry. He supposed that Dr. Carpenter could justly be regarded as the prototype of the chemical engineer, of whom so much was now heard. His work was connected with a gas company; "a" gas company had become "the" gas company under his leadership, for the South Metropolitan Company, from the point of view of the application of science in industry, stood second to none either in this country or in the world. [Applause.] In his employment with a gas company, Dr. Carpenter had every scope for his ability as an engineer and as a chemist. In 1899, he had become Chief Engineer of the Company, and, at a later period, he had followed the late Sir George Livesey as Chairman of the Company. Dr. Carpenter, a man of broad vision, had looked ahead as regards what had to be done with gas in order to place it ahead of possible competition. Users of gas were inclined to think that they suffered under monopoly, and received an article which was just good enough to deprive them of any legal remedy in order to get it bettered. This had never been Dr. Carpenter's policy. His policy had been to provide us, or those fortunate people who lived in his area, with a gas so good that nobody would wish to change it for any of the other forms of lighting or heating. This policy, though, in a sense, a commercial one, had only been made possible by the technical work initiated and led, and in part contributed to, by Dr. Carpenter. He was also a leader of men, and had built up round him at Greenwich a fine, loyal, and able staff of workers. The Transactions of the Society of Chemical Industry had been enriched from time to time by many valuable contributions from the laboratories of the South Metropolitan Gas Company; and the Society looked to the same source for many more. In the circumstances in which the members were meeting, he did not think it was desirable for him to deal in any greater detail with the work of Dr. Carpenter, or with his achievements. What he wanted to feel was that, in saying little, he left nothing unsaid; and, speaking on behalf of the Council and of the members of the Society, he felt that, in selecting Dr. Carpenter as the recipient of the Medal, the Society were paying the highest tribute within their power to a fellow countryman of whom they were all very proud. Sir William Pope would give the meeting a brief extract of Dr. Carpenter's notes, and he (the President) felt quite sure that the indication which Sir William Pope would be able to give of Dr. Carpenter's address would confirm—if, indeed, confirmation were necessary—what great work Dr. Carpenter had done for the industry. Reflecting on Dr. Carpenter's work for the Society of Chemical Industry, and for the chemical industry itself, the President reminded the members that Dr. Carpenter was President of the Society during two critical years. He became President in October, 1914, and saw the Society through the first two difficult years of the war. During his period of office he was one of the founders, and the first Chairman of Council, of the Association of British Chemical Manufacturers. It was becoming history now, but, somehow or other, British chemical manufacturers had never been able to pull together in the way that their Continental rivals had done. If there was one man who had succeeded in harnessing the team, it was Dr. Carpenter; and his hands on the reins were so light that the team, almost before it knew it, had got together. Dr. Carpenter's deeds for the future had been many; but in his (the President's) own mind he believed that this particular one would probably, over a period of years, be found to have been fraught with greater consequences to the industry than almost any other.

DR. CARPENTER ON THE HISTORY AND THE PRESENT TECHNICAL POSITION OF THE GAS INDUSTRY.

Sir WILLIAM POPE, abstracting Dr. Carpenter's paper, said it was a comprehensive account of the past history of the gas industry,

and its present condition, and an extremely illuminating exposition of what the author imagined would be the future of the industry. Dealing with the early history of the distillation of coal, he told how, in the Transactions of the Royal Society in 1739, the Rev. Dr. Clayton had communicated a paper—the first published on this subject—in which he had said: "I got some coal, and distilled it in a retort in an open fire. At first there came over only phlegm, afterwards a black oil, and then likewise a spirit arose, which I could no ways condense; but it foreed my lute, or broke my glasses. I then had a mind to try if I could save any of this spirit; and in order to do this I took a turbinated receiver, and, putting a candle to the pipe of the receiver while the spirit arose, I observed that it catched flame, and continued burning at the end of the pipe, though you could not discern what fed the flame. I then blew it out, and lighted it again several times, after which I fixed a bladder. I kept the spirit in bladders a considerable time, and endeavoured several ways to condense it, but in vain."

Dr. Carpenter told of the early work of Murdoch and Watts on the production of coal gas, and then came what was a most characteristic touch on the part of Dr. Carpenter. He was primarily an engineer, and, therefore, one would not suspect him of having any bias towards chemical subjects. He had pointed out, in dealing with the conditions in which the gas industry was carried on, that we could look upon the whole industry which was concerned with the distillation of coal as a kind of circle, in the centre of which the actual process of coal distillation stood, and, radiating from this centre, ancillary to the actual process of coal distillation itself, were the enormous complexity of industries which were based on the utilization of coal and its products. Commenting on this picture, he said that everywhere we met the hand of the chemist controlling these industries; but when they came to the primary operation, the destructive distillation or carbonization of coal in the production of town gas, they saw but little evidence of his work in the operations generally carried on to-day. The plant employed was, in principle, practically what it was a century ago. He did not mean to imply by this that no development had taken place; the retorts were larger and longer, and, being more resistant to heat, were worked at a higher temperature. Also, machinery had been substituted for hand labour in many of the subsidiary operations. These tasks were peculiar to the functions of the engineer; and he had performed them admirably. He was, of course, carrying out what was primarily his own particular task—*i.e.*, the mechanical operating of a particular process. Dr. Carpenter went on to ask: "What must be said of a process the raw material of which has been most inadequately studied?" Throughout the whole of the address, the keynote was to the effect that coal itself, the original raw material used in gas manufacture, had received far too little study at the hands of the chemist.

The author then gave an account of our present knowledge of the nature of coal, and contrasted the imperfect state of the information which was possessed as to coal itself with the complete and highly complex knowledge that we now possessed of the constituents of coal tar. It was obvious that the picture the author had in mind was one in which he saw that the question of the composition of coal tar, and the utilization of the enormous number of chemical substances which it contained, had been carried to a high pitch of perfection, and that many great industries had been founded upon this minute examination of coal tar itself. Apparently, he foresaw that ultimately we should be able to utilize coal in the same multiplicity of ways in which we now utilized the constituents of coal tar, by reason of getting, in the fullness of time, a more perfect knowledge of the composition and constitution of coal itself. While it was a relatively simple matter to lament the small amount of information which even to-day existed upon the complex questions of coal constitution, only those in intimate touch with the subject could appreciate the intricacy of the problem. Despite the considerable work carried out in recent years, it was still a bewildering matter to attempt to form a clear impression of the position to-day. One body of workers had concentrated on the palæobotanical side with commendable results; others had submitted the coal substance to the action of solvents and of chemical reagents; and another set of investigators had studied the coking properties of coal and its general behaviour under heat. They were, indeed, only collecting bricks wherewith to build a temple of knowledge; and as yet no master architect had arisen to design the structure. Until this happened, it would appear that they must be content to study effects rather than determine causes. He believed that much greater knowledge of organic chemistry was required before this vast accumulation of information was correlated. The general idea which inspired Dr. Carpenter was that the engineer had done all he could, and it was now the part of the chemist to take the work in hand—to study the raw material, coal, with the same energy and efficiency as had been devoted to the study of the components of coal tar.

Dealing with the behaviour of coal under heat, Dr. Carpenter stated that Weyman had recently shown that a more rapid heat transference was effected by the gases evolved during carbonization than by conduction through the charges or by radiation. In the case of a bituminous coal this method of heat transference was retarded by the formation of plastic layers, whereas with anthracitic coal heat transference by means of the gases could take place readily; and this accounted for the rapidity of carbonization of these coals.

Discussing the coking of coal, Dr. Carpenter had given a brief account of the way in which the binding of the coal was affected by the oxygenated constituents of the coal substance. He concluded the section by saying that probably a true picture of the mechanics of the carbonizing process was that it was one of high velocity—*i.e.*, that so soon as the coal particle was raised to the required temperature, the destructive distillation process proceeded very rapidly. The lag in the process arose from the time taken to raise the coal particles to the required temperature; and this was accentuated by the poor conductivity of the material and the formation of the plastic state through which the coal passed. This plastic state proceeded in layers in each coal particle from outwards inwards, and thus retarded the evolution of gas. When this condition was reached at the centre of the coal particle, it might be imagined that a turbulent state of affairs existed, and the gases evolved had to pass the gauntlet of the maze of cells of the hot coke to gain their freedom. The designation of "destructive distillation" was no misnomer—in fact, it was always a wonder to him (Dr. Carpenter) how so many of the complex hydrocarbons withstood the drastic treatment to which they were exposed.

Putting on one side the many subsidiary factors influencing carbonization, Dr. Carpenter said that the main factors which determined the value of carbonizing results were:

(*a*) The type of carbonizing vessel and the pressure maintained therein.
(*b*) The temperature to which the mass was eventually raised.
(*c*) The rate at which heat entered the mass and the time taken for the mass to attain the final temperature.
(*d*) The degree of heat and contact to which the volatile products from the coal were subjected.
(*e*) The state of division of the mass under carbonization.

Dr. Carpenter proceeded to say that the possibilities of low-temperature carbonization were being slowly developed. The future of low-temperature tar was as yet unknown; but extensive investigations by Fischer and his colleagues had added appreciably to their knowledge of the subject. It would appear that they were only on the fringe of the possibilities presented by low-temperature tar; and the future of the process itself might depend upon the results of this investigation. He was unable to appreciate, with the present state of knowledge of the low-temperature distillation of coal, the economic advantages of this process, and imagined that a suitable solid smokeless fuel was to be obtained eventually by the carbonization of coal under special conditions, but at a high temperature. The study of low-temperature tar had, however, proved of great value in interpreting the carbonization process itself; and it might eventually result that the study of tars produced at various temperatures might be one of the keys to solving the problem of the carbonization process.

In any discussion on the merits of various methods of coal carbonization, it must be borne in mind that the adoption of any one method was generally determined by special local requirements, or by the demands of the times. As coal was not only a source of gaseous energy, but also of tar products, and nitrogen and sulphur compounds, development would take place along those lines which gave the highest yields of the particular products required. Whereas low-temperature carbonization gave a comparatively low yield of ammonia, a very rich gas with a high yield of tar rich in low boiling-point paraffins, and a soft and easily-burning coke, gasification with air and steam on the Mond system resulted in a high yield of ammonia and a very large volume of a low-grade gas.

The lecture sought to bring home the fact that the distillation of coal in the production of town gas was not only a chemical industry, but that its development was only possible along lines to be laid down by the chemist and supervized by him. Vivid though Dr. Carpenter's dreams of the future might be, he had never yet visualized the community wholly supplied with gaseous thermal energy. He believed that gaseous and solid fuel had each their sphere of usefulness, and that their systematic use would go hand in hand. He also believed that in the largest cities, as in the smallest villages, the gas-works would be the portal through which all raw coal would be required to pass; and while it was the chemist to whom they must look for the achievement of this ideal, it was certain that he would need all the assistance he could obtain from his brother worker, the engineer, who had no longer the monopoly of "directing the great sources of power in Nature for the use and convenience of man."

The PRESIDENT, after thanking Sir William Pope for his abstract of Dr. Carpenter's paper, asked Mr. E. V. Evans to accept the medal on behalf of Dr. Carpenter. Mr. Evans, he said, was the Chief Assistant, Adviser, and Aide-de-camp to Dr. Carpenter on the chemical side of his work, and, as they all knew, was one of the most loyal of his very loyal staff. In Mr. Evans they had an excellent and worthy representative of the team which had aided, and is aiding, Dr. Carpenter to do all that he had done, and is doing; and he (the President) felt that, in handing the medal to Mr. Evans, the Society were, in a sense, stimulating Mr. Evans and his colleagues at Greenwich and elsewhere to give even more arduous and more loyal service to the cause of chemical industry, and in this way the medal would effect greater usefulness than its prime purpose of honouring the work of a great man. He presented the medal to Mr. Evans, to hand on to Dr. Carpenter.

Mr. E. V. EVANS, in accepting the medal on behalf of Dr. Carpenter said he had reason to know that Dr. Carpenter was

deeply appreciative of the honour conferred on him by the presentation of the Society's medal. He (Mr. Evans) was not aware until a late hour on the previous night that Dr. Carpenter was unable to be present. He could, however, assure them that the cause of Dr. Carpenter's absence was something quite beyond his control, for he had looked forward with great enthusiasm to meeting the members again and addressing them. He had been associated with Dr. Carpenter for more than twenty years; and in carrying out his duty that day, his task was an exceedingly difficult one, for while, on the one hand, he wished to leave with them a student's appreciation of a master, yet he knew that if he conveyed his true feelings towards this man, and his appreciation of his greatness, it would displease him, for Dr. Carpenter was conspicuous for his modesty. He was the leader of a large undertaking whose policy—and more particularly the technical policy—he had made unique. He had demanded the manufacture and distribution of a constant product day in and day out, and had devised apparatus in which that constant product should be consumed with the attainment of high efficiency. Dr. Carpenter had laid down as a fundamental principle that the coal gas manufactured by his Company should not vary except within very small limits from hour to hour, even from minute to minute, and that it should, as nearly as possible, burn to carbon dioxide and water vapour, and for this purpose he had devised a process for the elimination of sulphur compounds. He had further decided that the consumer of coal gas, whether for the production of light, heat, or power, should not be required to adjust his appliances, and, with the supply of a constant quality of gas, he had devised apparatus the air supply to which was fixed and unalterable, and which gave maximum efficiency. This had, in some quarters, been considered to be the work of an idealist, for it had necessitated not only elaborate control of the gas-manufacturing process, but also the manufacture in the Company's own works of the standard appliances required for burning the gas; but he could assure them that this large-minded policy had, by its results, paid handsomely. He (Mr. Evans) could entertain them for a long while upon the contributions that had been made by Dr. Carpenter in the domain of applied science; but, for the reason given, he must refrain from so doing. Dr. Carpenter was essentially a man of detail, and was an exceedingly hard, but fair, master. He was a hard master in that he had acquired such an intimate knowledge of every aspect of the process which he conducted that the standard he set, and expected, was one which many of his assistants fell very short of. For many years he had considered the carbonization of coal to be a process falling within the category of applied chemistry; but, as a chemist assisted by an efficient staff, he (Mr. Evans) had been unable to satisfy his requirements. Dr. Carpenter's mind—if the speaker might be so precocious as to analyze it—was fundamentally scientific, yet he did not arrive at his conclusions by a method of cold and slow reasoning in logical sequence, but possessed an uncanny means of thinking rapidly; and it was remarkable to find that the conclusions at which he arrived so quickly would bear strict scientific analysis. Although he did not claim to be an orator, and was, indeed, almost tongue-tied with a responsibility of this magnitude, he felt that the Society's choice had fallen upon one who richly deserved the honour done him. He (Mr. Evans) knew that Dr. Carpenter had received the news with great satisfaction, and even pride, and that he had given considerable time and thought to the preparation of an address which (as Sir William Pope had indicated) said, in a few words, that the gas industry was waiting upon advancement in chemical science for its further development. In the name of Dr. Carpenter, he expressed thanks for the honour conferred upon him, and regretted, with the members, the fact that Dr. Carpenter had been prevented from attending in person to receive the medal.

Mr. W. J. U. WOOLCOCK (General Manager of the Association of British Chemical Manufacturers) said that if anything were possible that day to mitigate their sense of loss in not having Dr. Carpenter with them, it would perhaps be the "masterly" analysis—and he used the word advisedly—of Dr. Carpenter's paper which had been given by Sir William Pope. He presumed that, among great chemists, there were born abstractors, as there were born manipulators; and Sir William had produced an abstract of a paper, in the course of an hour or so, the details of which they would all read with the greatest interest. The man to whom the Society had given the greatest honour they could bestow was, in his judgment, a many-sided man. They were not so familiar with the various aspects of his character as they would be were it not for the fact that Dr. Carpenter deliberately repressed himself in many directions. He was a great lover of art and a great student of literature. There were many branches of activity in life into which he could have entered most successfully, and in which he could have made his mark equally as well as he had in chemistry and engineering. Sir William Pope was a born abstractor; but Dr. Carpenter was a born expert witness. Those who had seen him in the witness box must, on many occasions, have realized that there stood a man who was an expert witness. He himself had cross-examined Dr. Carpenter on one occasion for a couple of hours, and it was one of the most enjoyable two hours that he had had in his life. But there were other sides of Dr. Carpenter's character. He asked his hearers to think of a man who might have been great in art or in literature, as he was in science and engineering, and then to think of the same man in his work in connection with co-partnership. To go round the works with Dr. Carpenter was an education. They realized that there was something in the man, something in the touch between the man and the workpeople, which was too frequently absent. It was not only his chemists, not only his foremen, not only those who surrounded him in the Board room, but also the workpeople who knew it was Dr. Carpenter, the President of the Company; but, at the same time, there was something about him which told those workpeople that here was a man who had thoughts beyond his immediate work, and who had thoughts and ideals for his workers. His name would be associated indelibly with co-partnership employment, which was not originated by him, but which was carried on and extended by him in a very great degree. Mr. Woolcock then dealt with the work of Dr. Carpenter in connection with the politics of chemical industry, and mentioned the Association of British Chemical Manufacturers. That Association—and he (Mr. Woolcock) was proud to be able to speak on behalf of the Association—owed an enormous debt to Dr. Carpenter; not only did the Association owe him a great debt, but the industry as well. The problem was as had been stated by the President. In this country all attempts to induce chemical manufacturers to combine were a failure until Dr. Carpenter came along. He had seized the opportunity afforded by the war, because during the war we were all convinced that the chemical industry of the country was the great key industry; we affirmed, with our hands on our hearts, that never again should Germany obtain the mastery. Dr. Carpenter well knew that, after the war, some would be lukewarm; those who, in the excitement of the moment, had realized what an asset the industry was to the country, but who would grow cold. At that time even the Government had realized that the chemical industry was essential to the safety and welfare of this country, and the Government were anxious to have some body which represented the manufacturing side, to whom it could turn for advice and assistance. Fortunately, Dr. Carpenter was then the President of the Society of Chemical Industry; and the Society, joining with the Society of Dyers and Colourists and with the Chemical Society in a joint Committee, had established the Association of British Chemical Manufacturers. This was an extraordinary thing to do, and needed an extraordinary man to do it. He could say, in a sentence, why. There had always been in the chemical world, as far as he knew, one big question which might at any time wreck the industry, and that question was the disposal by the gas companies of their chemical products. He asked the members to visualize, on one side, the gas companies, with the security of their Acts of Parliament, and with the necessity of pouring out their bye-products if the price of gas was to be reasonable, and, on the other, the chemical manufacturers, with no constant product, such as gas, to help them out when necessary, but with the necessity of manufacturing chemicals and selling them in this country. It was easy to see that there might have been—and there was, he believed, for some years—some small amount of conflict of interest between the gas companies and the chemical manufacturers here who were not gas companies. This was the real problem which had to be solved, and the problem which the genius of this man, Dr. Carpenter, had overcome. He was the ideal person to tackle it; indeed, the only man who could do it; and it was (as the President had said) a monument to his tact, to the confidence with which he was regarded by all those who knew him, that he was able to bring together those whose views were bound to be in conflict, and to amalgamate them into one body for their own good and for the good of the country. He (Mr. Woolcock) had known Dr. Carpenter personally; he was his first Chairman. They all recognized that his was a lovable personality to a wide circle, and to those who had the privilege of his friendship he was a rare friend. (Loud applause.)

Melting-Point of Coal Ash.—Apparatus for the determination of the melting-point of coal-ash, and the results of investigations, were described in a paper submitted recently to the Manchester Section of the Society of Chemical Industry by Messrs. F. S. Sinnatt, A. B. Owles, and N. Simpkin, who stated that though the general literature of the subject of coal ash and associated problems is extensive, little information has been published upon the melting point of the ash from English coals. Adopting the term melting point to describe the complete melting of the ash, the authors included a table of the composition of ash in vitrain, clarain, durain, and fusain, showing that the ash might be expected to have different melting-points; and this feature was one which it was desired to emphasize in the paper. Further, determinations indicated that the ash from vitrain, durain, clarain, and fusain from the same seam may possess melting points which differ considerably from one another, though the evidence was not comprehensive enough to state that the individual ingredients possess characteristic melting-points. It appeared necessary to them, therefore, to examine the vitrain, durain, clarain, and fusain from various horizons in the same seam. Average results of a number of examinations to ascertain the melting-point of the ash at different horizons varied from 1185°C. to over 1440°C. In view, they added, of the results described by them, it becomes increasingly difficult to attempt to correlate the melting-point of coal ash with the composition as indicated by chemical analysis. It is clear that the composition of the coal ash may alter continuously throughout the seam. In a single seam the melting-points of the ash from the lump coal, nuts, slack, and fine coal may vary considerably

CORROSION IN GAS-MAINS AND METERS.

By H. G. COLMAN.

IN an article on the above subject by Mr. H. E. Williams, in the "GAS JOURNAL" for June 20, the conclusion is reached that the presence of hydrocyanic acid in the gas is of no importance in relation to the corrosive action which occurs, but that this is due almost entirely to the normal rusting process of iron by the action of moist carbonic acid and oxygen. If this conclusion is fully justified, it would afford much comfort to many gas undertakings at the present time, not only in this country but also on the Continent and in the United States, where greatly increased corrosion has been experienced in recent years. It is, however, necessary that this pleasing conclusion should be fully proved, as, if it is not in fact true, it would lead to a false sense of security.

On the results of many tests made during the past thirty years, I find myself quite unable to agree with the conclusion arrived at by Mr. Williams that the presence of hydrocyanic acid in the distributed gas is innocuous, but am strongly of the opinion that it is largely due to the presence of hydrocyanic acid that the corrosion is started. I agree, however, that, once it has commenced, then it is largely carried on by the normal rusting action of moist carbonic acid and oxygen.

With the results of the experiments given by Mr. Williams, I am in full agreement, and believe that hydrocyanic acid in itself is only a mild corrosive agent for metallic iron, far inferior to moist oxygen and carbonic acid; but the conditions under which his tests were carried out differ materially from those actually present in the services and meters. The great difference lies in the fact that, in addition to moisture, oxygen, carbonic acid, and hydrocyanic acid, in practice the gas always contains small quantities of ammonia, which alter the conditions and increase the corrosive action of hydrocyanic acid when this is present.

For some time past, Mr. E. W. Yeoman and I have been carrying-out tests designed to elucidate the reactions which occur; but partly owing to the fact that they have to go over long periods, and partly to pressure of other work, these are not yet completed. In view, however, of other publications, it seems advisable to publish the general conclusions to which these tests and other experience have led us in respect to the action which takes place on the interior surfaces of the pipes, meters, &c., through which gas containing moisture, carbonic acid, oxygen, and hydrocyanic acid is passing.

Owing to the variation in the temperature of the gas, there is a constantly recurring deposition of a film of liquid water on the surface of the pipes, &c.; and as soon as such a film of water is formed, it becomes alkaline by absorbing some of the ammonia present in the gas. This ammonia solution then takes up some of the hydrocyanic acid, forming a solution containing ammonium cyanide. Now though hydrocyanic acid itself forms but a feeble corrosive agent for iron, a solution of ammonium cyanide has a strong corrosive action, dissolving the iron, with the formation, first, of a solution of ammonium ferrocyanide, which readily deposits the insoluble iron ammonium ferrocyanides, forming "crude Prussian blue."

Not only does ammonium cyanide solution attack metallic iron, but it equally, or even more readily, attacks ferrous compounds, forming primarily a solution of ammonium ferrocyanide; this action being, in fact, the basis of the Rowland & Bueb process for the extraction of hydrocyanic acid from coal gas. It appears to us that it is to this action that the setting-up of the corrosion of the iron surface is mainly due.

The service pipes and the iron sheets when put to work are normally coated with a thin impervious layer, consisting essentially of mixed ferrous and ferric oxides. As is well known, the presence of this layer (formed while the pipes or sheets are being manufactured by the action of oxygen on the hot metal) acts as a decided protection of the iron beneath it from the action of oxygen and carbonic acid, thus greatly decreasing its tendency to rust. But this same impervious layer is readily attacked by a solution of ammonium cyanide, so that when a film of this solution forms on the inner surface of the pipe in the manner above described, the thin oxide film is rapidly attacked and disintegrated, and partially converted into a porous layer of Prussian blue. The metallic iron surface then has only a coating of highly porous material; and with the protecting film of oxide removed, the ordinary rusting process, due to the action of moist carbonic acid and oxygen, can proceed rapidly. The "rust" produced in the latter manner forms by far the largest proportion of the accumulated material in the pipes; but as this, when formed, consists of a mixture of ferrous and ferric hydroxides, it absorbs further quantities of hydrocyanic acid from the gas, with the formation of crude Prussian blue, in the manner suggested by Mr. Williams.

The general conclusion to which our tests have led us is, therefore, that, though the deposits formed from the iron have been to a large extent produced by the ordinary rusting of the iron, owing to the action of carbonic acid and oxygen, it is to the hydrocyanic acid, in conjunction with small quantities of ammonia present, that the *initiation* of the corrosion is mainly due, and that in the absence of hydrocyanic acid, even when carbonic acid and oxygen are present in considerable quantity, the life of the iron is greatly increased, as the protective film of oxide remains intact for a long time. If, as we believe, these conclusions are fully justified, it follows that the complete removal of the hydrocyanic acid from the gas before its distribution is urgently called for.

It is, however, in no way the intention to minimize the undesirability of having an undue percentage of oxygen in the gas sent out, as increase in the amount of this constituent does, in our opinion, tend to increase the extent and rapidity of the corrosion which occurs, even when hydrocyanic acid is completely removed. Where the latter is present, the rate of corrosion is also greatly accelerated when an increased oxygen percentage is contained in the gas.

In connection with the subject, the analysis of the deposit formed by the corrosion in service pipes may be of interest. During the past twenty years, we have made a number of analyses of such deposits, sent in by gas undertakings distributed widely over different parts of England, where serious trouble from blocked service pipes had been experienced. The following is the analysis of a typical sample:

Deposit taken from 1½-in. Service Pipe.

	P.Ct.
Loss at 100° C.	5·6
Further loss on ignition	27·0
Silica, SiO_2	1·2
Total iron calculated as Fe_2O_3	63·9
Total ammonia	1·3
Sulphur.	
As free sulphur	3·1
As sulphocyanide	1·3
As iron sulphides	*nil*
As basic iron sulphates	2·6
Total sulphur	7·0
Hydrocyanic acid.	
HCN as ferrocyanide	6·8
HCN as sulphocyanide	1·1
Total ferrocyanide, calculated as Prussian blue, Fe_7Cy_{18}	12·0
Total sulphocyanide, calculated as ammonium sulphocyanide, NH_4CNS	3·1

The loss at 100° C. consists for the most part of moisture, but condensed vapours from the gas, including naphthalene, are also present.

Qualitatively, the other samples were similar to the above, but the proportions present varied materially. The Prussian blue content varied from 3 to 16 p.ct., that of sulphocyanide and of ammonia from 1 to 4, and that of free sulphur from 1 to 5. Speaking generally, the trouble with corroded services was worst in those places where the percentage of Prussian blue was highest.

The invariable presence of considerable quantities of free sulphur is of interest. This occurs even in districts where the gas has for long periods been severely tested for absence of H_2S; and its presence is in all probability due, as Mr. Williams suggests, to the carbon bisulphide in the gas. Our evidence goes to show that in the presence of rust a slow combination of carbon bisulphide and ammonia occurs, with the production of ammonium thiocarbamate ($NH_4S.CS.NH_2$), which readily changes into ammonium sulphocyanide, with evolution of sulphuretted hydrogen. The latter is absorbed by the ferric oxide in the deposits, forming iron sulphides, which revivify with the oxygen present in the usual way, re-forming ferric oxide, and depositing free sulphur. Some of the deposits contained appreciable amounts of iron sulphides; but this soon disappears on exposure to the air. The sulphocyanide present appears to be formed, in part, in this manner; but in all probability a portion of it is formed by the direct action of the hydrocyanic acid on the ammonia, free sulphur, and temporarily-produced sulphuretted hydrogen.

Though any sulphuretted hydrogen produced in the manner set out in the preceding paragraph would mostly be absorbed by the oxide of iron present, it appears quite likely that a small proportion of it might escape absorption and travel forward with the gas. Possibly some of the cases of local occurence of "dirty" gas, when the main supply was quite free from sulphuretted hydrogen, may have been brought about in this manner; and experiments are in progress to test this possibility.

Home Lighting.—The current issue (No. 112) of the British Commercial Gas Association's "A Thousand-and-One Uses of Gas" contains a series of excellent illustrations of types of gas-fittings recommended for the lighting of the various rooms of the home, and may therefore be profitably studied by those about to furnish or re-decorate.

Chemistry at the British Empire Exhibition.—At the annual meeting of the Society of Chemical Industry at Cambridge last week, it was announced that the Society had agreed to co-operate with the Association of British Chemical Manufacturers in organizing the sections covering pure and applied chemistry of the British Empire Exhibition. Dr. Levinstein and Dr. E. V. Evans were nominated members of the Provisional Committee to arrange procedure.

Fuel Research Board and Sir George Beilby.—We are sorry that a slip in the heading of an announcement in last week's "JOURNAL" should have made it appear that Sir George Beilby had resigned from the Fuel Research "Committee." As was stated in the announcement itself, it is, of course, from the positions (which he has for nearly seven years so ably filled) of Director of Fuel Research and Chairman of the Fuel Research Board that Sir George Beilby has retired.

BRITISH CHEMICAL SOCIETIES.

Suggested Confederation.

In his Presidential Address to the Society of Chemical Industry last week, Dr. E. F. ARMSTRONG, F.R.S., suggested that the time had come definitely to propose a policy of confederation of chemical societies; and his remarks on this subject are reproduced below.

The attempt was made a few years ago to bring into being a body common to all the societies concerned; and, accordingly, the Federal Council for Pure and Applied Chemistry was formed. Composed of delegates from a number of the societies, its functions are to initiate and co-ordinate effort, and generally to advise in matters affecting all the societies—*i.e.*, chemistry in general. While a body so constituted can only act with diplomatic slowness, it has already much to its credit, in particular the initiation of international gatherings. It has, moreover, served as a model to other countries and to other sciences. The Federal Council include among their members the Association of British Chemical Manufacturers, who, though primarily a trade protection association, have their constitution very widely drawn, and are active in promoting the application of science in industry. We have in the Federal Council a nucleus or skeleton organization to which can be entrusted the difficult task of forming one great chemical society, and raising the necessary funds for our future home—the Chemical House.

I would suggest that the time has come to make the definite proposal that it should become the agreed policy of some, if not all, the societies concerned to take steps as appear expedient to bring about a gradual confederation. It would appear obligatory that I should submit a crude draft outline of a scheme. Chemists and others interested in chemistry would become members, in the first place, of the confederation, and, in the second, of a particular society or section. The government would be in the hands of a Grand Council, chosen in part from the members and in part nominated by the sections. The actual work would be done by an executive elected from among the Grand Council. The administration would be in the hands of a general manager, assisted by sectional secretaries. A staff of editors would produce the publications. The existing societies under this scheme would be incorporated as a whole, so as to retain in full the great asset of their "goodwill," but would have their activities more closely defined.

Each society would continue to devote themselves to the particular branch of the subject with which they had been associated in the past; but all overlapping would be entirely eliminated. The Institute would continue to act as an examining body, and maintain a register of fellows and associates, who alone would be entitled to use the professional qualifications, F.I.C. and A.I.C. The remainder would be simply members using no professional distinction. The unnecessary custom of using the letters F.C.S., which have no meaning whatsoever as a qualification in the professional sense, would disappear. The Institute would also watch over the important question of professional etiquette. Weighty committees would be established to deal with the Government departments and with public propaganda.

It is not difficult to outline a fairly full and comprehensive scheme; but this is better done by a committee than by an individual. It will suffice, therefore, for me to make the proposal that the Councils of all the Societies proceed to examine the question next session and consider the propriety of asking the Federal Council to form a committee to study forthwith the desirability and practicability of federating the Chemical Societies. Difficult as it will be to effect the welding together of the British Chemical Societies into one body, yet this is bound to come about if the pressure from the rank and file is strong enough. It can succeed in no other way.

A much more delicate question will then remain to be settled before the profession of chemistry can take rank with medicine or the law. Indeed, we have among ourselves to decide whether the word "chemist" is to have as wide a meaning as the term "engineer," or a restricted meaning like the term "solicitor" or "accountant." The engineer may be at the very peak of the profession or occupy any other grade down to the skilled fitter. By "solicitor" or "accountant" a qualified man is understood. At present we cannot even lay claim to a monopoly in the application of the term "chemist," though I do not despair of educating the public on this point; but the outstanding feature is that the chemist may or may not be fully qualified.

If we are ever to rank as a profession, then we must resolutely close our ranks to all but the qualified, possibly using the term "chemical assistant" for the large number in works who will be unable to qualify through no fault of their own. But it is essential that all who practise chemistry—as consultants, analysts, teachers, or in any other public capacity—are qualified. The Institute of Chemistry, now that they have filled their ranks and are really representative of the profession, should devote all their influence and resources to attain this end. The harm and the mischief which are being done to-day by unqualified and incompetent—the two words are generally, though not necessarily, synonymous—persons who style themselves "chemists" is very considerable—far greater than most of us realize.

Many other matters were dealt with in the address, which was listened to with close attention by the members.

COKE SALES IN THE MANCHESTER DISTRICT.

It was stated in the report of the meeting of the Central Executive Board of the National Gas Council which appeared in last week's "JOURNAL" that the Manchester District Executive Board had forwarded to the Council a report of the Lancashire Commercial Section of the Manchester District Institution of Gas Engineers with regard to coke sales, which, after consideration, had been approved. It was reported that the arrangements arrived at in this connection in the Manchester area had met with great success; and we therefore are pleased to be able to reproduce the report, in the hope that the suggestions contained therein may be found useful by others.

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

Lancashire Commercial Section.

SURPLUS COKE.

(1) It is suggested that all actual surplus coke in the district should be disposed of by shipment through the Coke Committee of the Lancashire Commercial Section of the Manchester District Institution of Gas Engineers.

(2) The undertakings of towns who do not make sufficient coke to fill the requirements of their district shall notify the Coke Sub-Committee of the additional tonnage they can handle from time to time; and the Coke Sub-Committee shall place them in communication with the undertakings who have surplus for disposal.

(3) The surplus so disclosed to be notified to the District Coke Sub-Committee of the Commercial Section, who, in the first instance, will notify each undertaking of the towns where there is no surplus and the make is not equal to the demand, when they could make suitable arrangements with the undertaking of such town direct, and dispose of the surplus at satisfactory prices—a suitable margin of 6d. per ton being allowed to cover the additional cost of disposal and supervision. Or, if preferred, neighbouring undertakings similarly situated may make their own arrangements on these lines, notifying the Coke Sub-Committee that they have done so.

(4) Any further surplus, being the actual surplus, could then be pooled and sold for shipment through the Coke Sub-Committee of the Commercial Section, as before mentioned.

(5) That the National Gas Council be asked to approve these suggestions, and:

1.—To approach the various District Executives of the National Gas Council in regard to the suggestions, and to recommend their acceptance.

2.—That these District Executives should then approach their various Commercial Sections, with a view to agreement with recommendations.

3.—That these Commercial Sections be asked to appoint Special Coke Sub-Committees, in a similar manner to that suggested for the Manchester area, with a view to co-ordination.

(*a*) Among their own members.

(*b*) With the other Coke Sub-Committees throughout the country.

(6) If it is found desirable to sell surplus coke through agents for land sales at cut prices, it should be distinctly agreed that such surplus coke should not be sold to any district without the consent of the Coke Sub-Committee in that district, or the producer into whose town it is proposed to send; and in case of any infringement of this agreement, members should be notified and recommended not to make further sales to such firms.

COKE SALES.

Suggestions.

(1) That each undertaking take steps to increase its local sales by every possible means—for example, by grading coke to suitable sizes for various classes of use, by deliveries in bags from 1 cwt. to a full load; by having a census made of all large and industrial users, and representatives sent, or inquiries made by letter as to their requirements, and special terms quoted according to quantity and cost of delivery.

(2) Where a system of allowing a discount to local agents is in force, there is no objection to such being continued under special safeguards as to competition in prices, or sales of outside coke.

(3) Where undertakings have supplied special large users outside their own area over a period of years at special contract prices, they should be entitled to consider them as included in their own local and legitimate trade.

Free Sulphur in Motor Fuels.—Writing in "Chemistry and Industry" (the Journal of the Society of Chemical Industry), Mr. E. C. Craven, M.Inst. Pet. Tech., F.C.S., points out that the trouble experienced by motorists of the blackening and scaling of copper gauzes, tubing, or the like, has been traced to the presence of sulphur in a free state, which occurs to a greater or less extent in all the motor spirits now on the market. Hitherto there have been qualitative methods only for the determination of this constituent; but some recent work carried out in the laboratory of Dr. W. R. Ormandy has led to a simple quantitative method for determining the amount of free sulphur in motor fuels. A measured volume of the fuel is shaken with mercury until the whole of the sulphur is converted into mercury sulphide. This is filtered off on a wet asbestos plug, oxidized to mercuric sulphate, and the sulphur determined by barium chloride in the usual manner. In the matter of free sulphur, samples of benzole of English manufacture compare very favourably with imported samples. Mr. Craven thinks the fact that such a method now exists for the determination of that sulphur which is so deleterious to copper may result in great attention being paid to the presence of this particular impurity by the producers and refiners.

WALES AND MONMOUTHSHIRE DISTRICT INSTITUTION OF GAS ENGINEERS AND MANAGERS.

GENERAL MEETING AT PORTHCAWL.

Favoured by fine weather conditions, the Institution held a thoroughly enjoyable meeting last Wednesday in Porthcawl, an invigorating and beautifully situated little South Wales seaside resort which, already growing rapidly, promises to become still more popular as time goes on. The chair was occupied by the President, Mr. Octavius Thomas, of Pentre.

The meeting was held in the Council Chamber; and there was an attendance of some thirty members.

The Late Mr. Robb.

The President (Mr. Octavius Thomas) remarked that, before commencing the business of the day, he was sorry to have to report the death of their ex-President, Mr. James Robb, of Chepstow; and he would ask the members to indicate their sympathy with his widow and family.

This the members did by rising silently in their places.

A Welcome.

Councillor W. J. Griffin, after apologizing for the absence of the Chairman of the Council (Mr. Parry Evans) and the Clerk (Mr. Evan Davis), owing to other business engagements, went on to say that, as Chairman of the Porthcawl Gas Committee, it was his duty to extend to the Institution a very cordial welcome to the town, and to say how delighted the Council were that it should have been decided to hold the meeting in the town. In the past, they had been somewhat handicapped, by the lack of suitable halls, in issuing invitations to bodies like the Institution to hold their conferences in Porthcawl; but fortunately, owing to private enterprise, this difficulty had now been overcome.

The President, on behalf of the Institution, thanked Councillor Griffin for his kind welcome.

Minutes of the Last Meeting.

The Hon. Secretary *pro tem.* (Mr. J. Mogford) read the minutes of the last meeting; and they were confirmed.

A number of apologies for absence were also notified.

New Members.

The following new members were elected: Mr. B. James Bell, District Superintendent, Cardiff Gas Light Company; Mr. Charles Bateman, Assistant Engineer to the Cardiff Gas Light Company; Mr. Samuel Walker, Manager of the Porthcawl Gas-Works; Mr. J. Bennett Hughes, Assistant Manager of the Rhondda Council Gas-Works; and Mr. Frederick W. Croxton, Manager of the Llandrindod Wells Gas-Works.

Annual Report.

The Council, in their eighteenth annual report, stated that during the year four new members had joined, one had died, and four resigned, leaving the number at the end of the year at 76 members and 5 students. The receipts for the year amounted to £39 14s., and the payments to £26 6s. 2d., leaving, with the balance brought forward from last year, the sum of £78 19s. 3d. in the hands of the Treasurer.

The Education Scheme.

Mr. George Clarry (Cardiff), in moving the adoption of the report and accounts, referred to the substantial balance in hand. With regard to the education scheme, to which allusion was made in the report, he was sure they would all wish that the good work done by Mr. Walter Hole, who had addressed them on the subject at their last meeting, should not be forgotten. It had not been forgotten by them as an Association; and as far as they in Cardiff were concerned, they were very much alive to the advantages of a good education for all the young employees, whether on the works or in the office. He would like to say a word with regard to the Technical College with which he had the privilege of being associated. They were looking forward very keenly to the opportunity of improving the status of the profession. It was desired that not only Cardiff but the whole district should participate in the benefits, and that young men should be sent there, either as part-time or full-time students, from all places where no educational facilities existed. The results would assuredly be very good. The general raising of the status of the profession was the ambition of the Institution and every individual member.

Mr. W. Valon Watson (Ebbw Vale) seconded the motion.

The President intimated that he had received a letter from Mr. Walter T. Dunn (the Secretary of the Institution of Gas Engineers) pointing out that it had been arranged to bring into operation in the session 1923-24 the scheme for the education and certification of those engaged in the technical work of the gas industry, which was approved by the Institution of Gas Engineers at their special meeting in February last. The letter proceeded: "The Committee confidently look to your Institution to co-operate wholeheartedly in the inauguration of the new scheme. There are two ways which the desired co-operation can take at the present stage. The first is that of suitably impressing upon the junior members of the staffs of the undertakings represented in your Institution the advantages of better technical education, and doing everything possible to create and foster a desire for such self-improvement. The second is by securing for suitable men the fullest possible facilities for the pursuit of their studies. The facilities desired are: (*a*) The concession of a few hours' leave (say, one half-day per week during sessions) for attendance at day-time classes; and (*b*) financial assistance in the re-imbursement of the student for any travelling expenses and class fees which he may have to bear. These two items may involve a heavy drain on the slender resources of an earnest and promising student at a time when he is least able to sustain it, particularly when it is remembered that the scheme provides for class attendance upon three nights per week throughout the winter months. If thought desirable, this re-imbursement could be made contingent in whole or in part upon diligence and success in the studies undertaken."

The report and accounts were then unanimously adopted.

New Office-Bearers.

The following officers were elected for the ensuing year:

President.—Mr. W. Clark Jackson, Neath.
Vice-Presidents.—Messrs. W. H. Johns and D. J. Davies.
Members of Council.—Messrs. J. P. Jones, D. W. Davies, and H. D. Hazell.
Hon. Treasurer.—Mr. J. H. Canning.
Hon. Secretary.—Mr. Octavius Thomas.
Hon. Auditors.—Messrs. A. T. Kyle and A. E. Williams.

The President, proposing the election of Mr. Jackson to the Chair, remarked that he was so well known to all of them that no words were necessary to commend him to the members.

Mr. W. H. Johns (Swansea), who seconded, pointed out that Mr. Jackson had been actively engaged in the construction of new carbonizing plant at Neath; and they would all look forward to renewing their acquaintance with the gas-works there, so as to see what had been done.

Mr. Jackson, acknowledging his election, expressed his regret that the Senior Vice-President (Mr. Evan Rees) of last year had not found it possible to take on the Presidency. Mr. Rees had, however, now left their district to take up an appointment in a large London works. He (Mr. Jackson) would do his best to follow in the footsteps of the excellent Presidents that the Institution had had in the past.

The President, alluding to the position of Hon. Treasurer, stated that Mr. Henry Morley had written that his doctor desired him to be entirely free of any business engagements, and therefore he was reluctantly compelled to resign the office. He (the President) said the Institution were under a debt of gratitude to Mr. Morley for his services during the past eighteen years; and he proposed a hearty vote of thanks to him.

Mr. A. E. Davey (Aberdare) seconded the proposition, which was agreed to.

Benevolent Fund of the Institution of Gas Engineers

On the motion of the President, seconded by Mr. Evan Rees (London), it was decided to subscribe the sum of five guineas to the Benevolent Fund of the Institution of Gas Engineers.

GAS MANUFACTURE IN SOUTH WALES: ITS PAST AND PROSPECTS.

Mr. J. Mogford (Briton Ferry) then summarized the paper on the above subject presented by him at the last meeting of the Institution, and published in the "Journal" for Nov. 15, 1922, p. 433.

It was decided that this and the following paper should be discussed together.

Mr. D. Muir (Pontypridd) then read his paper on:

COKE-OVEN GAS FOR TOWN SUPPLY.

With 1419 coke-ovens erected in the area embraced by this Institution of Gas Engineers, it is worth while considering what becomes of the surplus gas produced by them. In a number of cases it is utilized for the production of power in the form of steam or electricity, the heating of the ovens, and partly for a supply to neighbouring gas authorities. During the year 1921 the quantity of coke-oven gas purchased by fourteen gas undertakings in the United Kingdom was 1,325,027,000 c.ft. Since then the demand for coke-oven gas by gas undertakings has increased.

What are the factors to be considered when contemplating the purchase of coke-oven gas for town supply?

1.—The condition and capacity of the manufacturing plant at the gas-works.

2.—The quantity, quality, and price at which coke-oven gas can be purchased.

If heavy expenditure is to be incurred in the renewal of manufacturing plant or in its extension to cope with an increasing output, then coke-oven gas is worthy of the consideration of undertakings in the proximity of coke-ovens. The cost of laying a main with necessary connections will undoubtedly be much less than that of new manufacturing plant. When deciding on the supply of coke-oven gas one must make certain that the coke-

ovens can supply the quantity of gas needed by the undertaking, and in such amounts as are required.

Regarding the supply, this must be of quality sufficiently constant to meet the obligations of the gas concern to their consumers as contained in any of their Acts. The price must be one well under the cost at which gas can be manufactured at the works, and which would compensate for the upkeep of stand-by plant.

Can such conditions be obtained? From my own experience —Yes. How can they be obtained? By a strong agreement between the buyer and the seller of the coke-oven gas.

The Supply at Pontypridd.

As to the supply of coke-oven gas to my Council, it has been possible to have amounts varying according to our requirements. That is, the supply has been increased during the peak loads as desired; and greater hourly quantities have been supplied during the winter months than in the summer months. The quality has been kept constant. The average quality of the gas supplied during the last sixteen months has been 488 B.Th.U. The following is an analysis of the gas delivered to us during last week:

	P.Ct.
Hydrogen	62·81
Oxygen	0·70
Nitrogen	6·58
Carbon monoxide	4·46
Carbon dioxide	1·63
Olefines	1·16
Methane	22·66

The gas is stripped; and no enrichment takes place at the gas-works. It is free of tar, and the naphthalene content averages 4 grains per 100 c.ft. The price paid is on a sliding scale, as follows:

When the price of coal delivered is	20s. per ton, gas price to be 1·4d. per therm.
" " " "	20s. and under 25s. per ton, 1·6d. per therm.
" " " "	25s. and under 30s. per ton, 1·8d. per therm.
" " " "	30s. and over per ton, 2·0d. per therm.

It is advisable, when making an agreement for a supply of coke-oven gas, to stipulate the quality to be furnished, and to embody penalty clauses in case of default.

Points to be Considered.

With a bulk supply of coke-oven gas, it is possible to shut-down the manufacturing plant at the gas-works, eliminate the worries due to fluctuating prices in the residuals market, and be in a position to supply consumers with gas at a cheaper price, which is conducive to increased sales. Against this, it must be borne in mind that it is necessary to keep a stand-by plant in readiness in case of failure of the supply of coke-oven gas due to breakdowns, strikes, and lockouts. It is also necessary to retain that class of employee who can be switched over at a minute's notice to take up the duties of stoking or water-gas manufacture. This all means expense, which must be met by the gas consumer.

With a large supply of coke-oven gas available in our area, we must not forget our competitors the electricity undertakings. This would supply them with a cheap form of power, which would enable them to market their commodity at a far less cost than at present, and might eventually result in their being able to wrest some of our business from us. In these circumstances, it is advisable for the gas industry to make as great a use as possible of this surplus gas. By its utilization, there must be a conservation of coal which is appreciable.

Since coke-oven gas has been adopted for town supplies, there appears to have been a closer co-ordination between those responsible for the administration of coke-ovens and gas-works. No doubt in the past the great aim in the coke-oven industry was to produce coke; and very little notice was taken of the quality of gas. To-day, with a gradually increasing use of coke-oven gas for town supply, the powers that be in the coke-oven world realize that, as this is a further source of revenue, it is up to them to supply a regular quality of gas to their customers—the gas undertakings.

With the improvement in the quality of gas supplied from coke-ovens, it is unfortunate that the coke-oven people are beginning to place an enhanced value on their surplus gas. When a figure such as 1s. 6d. per 1000 c.ft. is asked, it is best left alone.

In all likelihood several gas undertakings who before the war were fortunate enough to make contracts at prices as low as 4d. per 1000 c.ft., will soon be faced with the necessity for entering into new agreements; and doubtless the price will be much higher, and may be so high as to prevent a fresh contract being made. This brings prominently before us, when coke-oven gas is used for town supply, the necessity for laying aside annually a sum of money to keep the plant in as good a condition as if gas was being manufactured on the works, and so being able to recommence manufacture without incurring a heavy expenditure.

With high-pressure distribution it is possible to convey this surplus gas considerable distances, and in some cases may be the means of increasing business by supplying villages on the route of the main between the coke-ovens and the gas-works. In the future we may convey our fuel in the gaseous form through mains from the coke-ovens adjoining the coal pits, instead of as at present in the solid form *via* railways.

As far as my experience goes, coke-oven gas for a town supply is quite satisfactory. Still, any gas undertaking contemplating its use must study local conditions before arriving at a decision. No doubt we, as gas engineers, are loath to leave our own methods of gas manufacture, which are always improving; but it is up to us to take advantage of a surplus supply of coke-oven gas when it can be utilized to the mutual advantage of the gas industry and the consumer.

Discussion.

Mr. W. H. Johns (Swansea) proposed a hearty vote of thanks to the authors of the two papers. It occurred to him, if he might be permitted to say so, that he had had rather an exceptional experience in regard to the matters that had been brought to their notice, inasmuch as he had assisted in the erection and working of what he believed was the first and only coke-oven plant that had ever been built on an English gas-works—namely, that at the Saltley Gas-Works of the Birmingham Corporation. Further, during the war he was connected with a large undertaking in the North of England, which was faced with the urgent need of securing an additional supply of gas from any available source. At that time, of course, it was an exceedingly difficult matter to obtain permits to erect the necessary plant for producing further quantities of coal gas and water gas; and besides this the fit men were being taken away, and women had to be trained to carry on the plant then available. It was therefore decided to take a large quantity of coke-oven gas at high pressure through steel mains from a colliery some miles distant. The quality of the gas varied somewhat; but it certainly did assist to carry on during a very strenuous period, when the demand for gas in that particular district was very great. Thus in some ways the coke-oven people had helped them out of their difficulties in the past. With regard to the future, he did not know that they could look forward to much larger supplies of coke-oven gas being taken from the plants. In the case of a small undertaking, with insufficient stand-by plant, a supply of coke-oven gas might often meet a very difficult situation, if the business was growing rapidly and there was a shortage of capital—especially in these days, when capital was so dear. But when one came to deal with the larger undertakings, and considered the responsibility that must rest on the shoulders of the official who had to provide sufficient auxiliary plant to carry on in case of break-down at the coke-ovens, he thought the matter had to be looked at from a different point of view. In small works, the labour necessary for running the works was comparatively trifling; but in the larger ones it would be impossible to retain in the service of the undertaking sufficient skilled men to meet any possible shortage of coke-oven gas by promptly bringing into action the reserve gas-producing plant that must of necessity be kept on the works. Skilled labour must always be at hand to cope with an emergency of this character. This was a serious matter, and one which might put a different complexion upon the figures which had been placed before them that morning. Such men as he had referred to could not be expected to continue working as labourers; and, even if they did, it might be very undesirable to move them from work on which they were daily engaged to meet an emergency of this sort. This would mean that the figures given in the paper of 1·4d., 1·6d., 1·8d., and 2d. per therm must be substantially increased. It would be interesting also to hear from Mr. Muir how much must be added to these figures in the shape of cost per therm of the capital that had already been sunk in the undertaking. In the case of a municipal undertaking, of course, the capital charge was gradually wiped out by the sinking fund; but this did not apply to company working. Therefore it was a point which the company engineer had to watch very carefully. They knew that water-gas plant could be brought into use, thus reducing the number of men who must of necessity be kept on the works to deal with emergencies; but the percentage of water gas sent out would have to be considered. With regard to Mr. Mogford's paper, he saw that allusion was made to the increased utilization during recent years of producer gas and blast-furnace gases; but he would not like it to be assumed outside that town gas had not had its uses extended in the same period. It was within the knowledge of all present that the output of town gas had gone up by leaps and bounds. Unfortunately, owing to the war, the price charged for gas had unavoidably been high; but now, with better conditions, charges were being reduced rapidly in many directions, and this process would no doubt continue. Mr. Mogford had dealt to some extent with the historical aspect of gas lighting in South Wales. As a matter of fact, they were now building in Swansea their third gas-works, so that the Company had clearly every confidence in the continued and extended use of town gas. Naturally, the scheme imposed upon them very heavy capital expenditure; but in view of the present works having become too small, they had been obliged to undertake it. Though he had mentioned three works, only one would be in use. They were going to a new site, and everything was being arranged, not only to deal with present demands, but to suffice for a number of years ahead. Undoubtedly, high heats were being utilized to-day in the gas industry; and he was hoping to go still further in this direction at Swansea, by the adoption of silica retorts. It had been decided to fit one-half the retort beds with retorts made of silica. They were not putting in all retorts of this material, because it was desired to experiment a little, though he had every confidence in the result. When in Birmingham he had had considerable experience in the use of silica retorts built-up of sections, in which case a special form of silica was used. No doubt they were faced with very keen competition from the electrical people; but he had recently advised one or two gas companies in that district to adopt measures for the supply of electricity as well as gas. There was no question that a supply of electricity could be given by a combined undertaking as cheaply as, if not cheaper than, by an electrical undertaking pure and simple. One company he had recently advised with regard to the transference of a Board of Trade Order, which the town council obtained some years ago, and which they were now desirous of passing on to the gas company, in order that the latter might supply electricity. They now had to deal with the Electricity Commissioners; but this body, he believed, were offering no objection to such transference of an Order. It was true, as the author said, that the methods of making gas varied. Different engineers had different ideas, and different coals to carbonize; and local conditions affected the choice very consider-

ably. In Swansea they had gone back to large horizontal retorts; but there were some novel features about the installation which it might interest the members to see when later on the Institution arranged a visit to the works.

Mr. J. H. CANNING (Newport) seconded the vote of thanks, and agreed with Mr. Johns that Mr. Mogford had not perhaps taken so optimistic a view as he might have done with regard to the future competition of electricity and gas. At the same time, he said, Mr. Mogford had very rightly brought before them the new situation which had been created by the steps taken by the Government to unify the supply of electricity, especially in that district; but though they must, of course, take the matter seriously, he did not think they need look forward with any great degree of apprehension to this new state of affairs. In the first place, general experience had shown that committees sitting in London did not benefit industries controlled by them. At any rate, he had yet to learn that they did. Secondly, the local District Committees did not, he believed, work together with that harmony and desire to give way to each other's interests which should be the ideal for committees of that description. As a matter of fact, he thought, too, that some of the largest producers of electricity in the district were standing-out of the scheme altogether, and were being reproached somewhat severely by those who were inside the scheme. Naturally these big producers were very often turning-out electricity for their own purposes as a species of waste product; but for some reason or another they had failed up to the present to be persuaded that it would be to their benefit to join any scheme of the kind. Of course, the members must take into consideration the fact that Mr. Mogford wrote his paper some time ago, and that things moved very rapidly in these days; and consequently, if he were re-writing the paper now, he might possibly find himself able to adopt a more optimistic tone than he had done. This matter was also tied-up with the question of the supply of coke-oven gas; and he would like to say how heartily he (the speaker) agreed with all Mr. Johns had put forward on this subject. One of the greatest assets that the industry possessed in competition with electricity was the permanency and constancy of the supply gas was able to afford; and he ventured to suggest that, if they did anything which would shake the public confidence in this permanency and reliability, they would be damaging their industry very much. If they took a supply of gas from a coke-oven plant, it was quite possible that it might be constant in quality and prove desirable from other points of view; but this question of reliability entered very seriously into the matter. They all knew the experience they had had lately of just the time when a gas supply was most valuable to the public—namely, during a coal strike. This was the time at which a coke-oven supply was apt to cease to be available. As Mr. Johns had pointed out, in the case of a small works this might not make a great deal of difference; but with a large works it would be necessary to keep a big trained staff, and how were they going to maintain this staff in a fit condition for making gas? They could not keep a stoker idle for a year or two at a time, and then turn him suddenly into the retort-house, when perhaps his normal stoking weight of 11 stones had gone up 2 or 3 stones more. It would take that man three months to get into training again. Then it would of necessity mean the retaining at the gas-works of the usual heavy stocks of coal, &c., which would depreciate if kept for a considerable period. But he absolutely agreed with Mr. Muir that there was a considerable amount of this gas available, which would supply cheap heat and power to the public in a suitable form, and that they should consider every way possible of utilizing it to the advantage of the consumers and of the industry, while at the same time taking into account the serious aspects of the matter. On the subject of competition, Mr. Johns had told them that the Electricity Commissioners had no objection to a joint supply; but there was another method of electricity supply by gas undertakings to which he (Mr. Canning) would like briefly to refer, and that was the installation of private electricity generating plants. His Company had a number of these in outlying districts supplying houses of considerable size. The local electricity undertaking had been canvassing these people for a supply of their current; and in order to ascertain the exact state of affairs, he had had tests made of all the plants in question. These plants were frequently made up of what might be termed scrap material, and some were very old and others more modern. They were of different types; but he had been surprised at finding the remarkably good results that had been secured from these scratch plants. The generating costs ran from under 2d. to somewhere about 3d. per unit. As the Corporation were proposing to supply electricity to them at 7½d. per unit in this area, there was a considerable margin; and even adding capital costs and the cost of oil and the small amount of attendance required (which was in most cases nominal), he found that the generating costs were likely to come out well under 4d. per unit. Therefore he thought they had a very considerable field here which was up to the present comparatively undeveloped.

Mr. H. D. MADDEN (Cardiff) thought that the future of the gas industry rested entirely on conforming with the Gas Regulation Act, or the making of therms. To those who had had experience of it, it was quite a surprise to see the difference as compared with the old method of volume. This was the point the gas industry would have to hold first in consideration. The therm would be with them always. There had been debates as to whether it was the right form of gas supply; but there was no question about it in his mind. The therm was the very fairest method that could be devised of charging the consumer. ["Hear, hear."] He did not think their electrical friends liked the therm, because it was a comparable unit with their electrical unit. This was the basis of the future prospects of the gas industry. They had to find the plant which would turn-out therms in big bulk, and turn them out cheaply. It was no good making therms, if one could not sell them; and the cheaper they could be sold, the more they would dispose of. This should be the policy of the industry—to get down to supply gas in tremendous bulk; to send fuel through the mains, and do away with the consumption of raw coal. Some companies who had old plant—he referred more particularly to the South Metropolitan Company—had done wonderful work with their horizontals. It had been a surprise to some to find them turning out 70 therms per ton. He would not like to say what type of plant was ultimately going to resolve itself out of the present conditions; but he did believe they would get to central manufacture, more or less. He did not think they would in the future find half-a-dozen manufacturing stations in a small area. This was not conducive to economy. They would have to have big stations; to get these big stations, there must be a big load factor; and to get this big load factor, they must have cheap therms. This was vital to the interests of the community, and they must strive to arrive at it.

Mr. W. CLARK JACKSON (Neath) said there was no doubt that Mr. Mogford's review would be of great value to the younger members of the Institution. They were all of them apt to live in the present, and to forget the spade work that was done in the past by such men as those mentioned in the paper. Among the various suggestions made, the question of carbonization at the pit-head was discussed to a considerable extent prior to the war. It was well known, of course, that distance was practically no object so far as gas distribution was concerned; but unless they adopted total carbonization, there would still be the residual products to deal with, which would probably mean quite as much transport as was the case with coal under the present system. He fully agreed with Mr. Madden as to the Gas Regulation Act and its benefits. He had had a year's experience of working under the Act; and conforming to it in every respect had meant securing the confidence of the consumers. At the same time, taken all round, it had been of considerable benefit to the undertaking. It would, he trusted, along with modern methods of production, enable the industry to stand firm and fight successfully against electrical competition. In this fight they would be greatly helped by efficient supervision of the consumers' cookers, fires, lighting units, &c., by a suitable method of maintenance. In his own case, they gave free maintenance so far as labour was concerned, and only charged for material. This plan they had found of considerable advantage. A question which arose in one's mind was as to the value of varying discounts, according to consumption. To increase their business it would in many cases be essential, he thought, to arrange for such discounts to large consumers. With regard to Mr. Muir's paper, he also would like to know the capital stand-by charges and labour stand-by charges, so that they might be able to compare the cost of a coke-oven gas supply with that of production in their own cases.

The PRESIDENT (Mr. Octavius Thomas, of Pentre) remarked that Mr. Muir referred to 1419 coke-ovens as being erected in the area embraced by the Institution; but a large number of these would not have gas available, because they were not regenerator ovens. It must be remembered that in South Wales there was a scarcity of gas coals, and in consequence the collieries used a good deal of steam coal, which would cause a great variation in the quality of coke-oven gas. After all, the collieries were out to make coke, and not gas. He had come across coke-oven gas containing as much as 30 p.ct. of nitrogen, which was not of much use for supplying towns. His own Council were offered coke-oven gas before the war, and then went thoroughly into the question; but the economy which it promised proved to be so small that the Council decided not to accept it.

Mr. MOGFORD, in reply, expressed his gratification at the contributions to the discussion of those in charge of the larger undertakings. His own mission had never been with the big undertakings, but always with the small ones, and therefore his concern was with them. If he could draw the attention of engineers in charge of the small undertakings to the serious position with regard to the competition they were going to meet in the immediate future, then he would be quite satisfied with what he had done. Mr. Canning had put it to them that the electrical competition was not as keen as stated in the paper; that there was disunion in the electrical ranks. This he (Mr. Mogford) knew to be true, and it would afford relief to the smaller undertakings for the time being; but he hoped the owners and those in charge of such undertakings would hold a serious view of the competition that was in front of them. They had recently fought in the Houses of Parliament the South Wales Electrical Power Distribution Company's Bill, but were unsuccessful. The Company were told all they wished to know about themselves in the Committee Rooms; but to his mind they were more alive to-day than ever before. Since the passing of the Act, they had issued capital to the tune of £600,000, which was subscribed twice over; and the smaller undertakings must be prepared to meet very serious competition once this Company got going in a revived and completely re-organized form. This competition was practically nationalized; and the committees, though they might have their bickerings now, were working constantly, and presently would come to an understanding. Then the smaller undertakings would have to face the music. Another thing which would have to be taken into account was touched upon by Mr. Madden, when he referred to centralization. They had had in that district Regional Survey Committees, sitting and taking evidence as to transport, housing, and other questions. A report was subsequently made, which was put into operation in a very quiet sort of way. One read of committees being formed in different parts of the country that would deal with town planning. Unless small undertakings took a serious view of this, they would find again, just as was the case with the South Wales Power Company, that they were a little bit late. The electrical people were getting away with these committees. They were represented on the Regional Committees, and they would be in at the beginning. If he could induce them to see that the gas industry should have representation on these committees, so that they would be well in the field when the centralization of gas-works came about, he would be perfectly satisfied.

Mr. MUIR said the cost of their gas distributed was 11d. per therm. In such cases labour did present a problem, because when the coke-oven supply was switched on one must dispense with some men. The easiest way was to put off the unskilled men. After eighteen months, the stokers still seemed fairly hard and fit; and he did not think it would take them long to get into their old stride if necessary. As to stand-by plant, he was fortunate in having a water-gas set. He agreed with Mr. Johns that for a large undertaking the stand-by plant would constitute a big item; and therefore what was good for a small works might not be good for a large concern. He (the speaker) had no reason for not being confident that, in his area, the coke-oven gas supply was a good thing.

PLACE OF NEXT MEETING.

It was decided that the place of next meeting should be left to the Council; and, on the proposal of Mr. MADDEN, seconded by Mr. JOHNS, the Chairman and members of the Porthcawl Urban District Council were thanked for the use of the Council Chamber.

The business concluded, the party proceeded to the Pier Hotel, where they sat down to luncheon, with the President in the chair. Mr. Davis proposed "The Wales and Monmouthshire District Institution of Gas Engineers and Managers," and Mr. Evan Rees responded—remarking that times out of number had compliments been paid to their worthy President, but none could be sufficient for the services he had rendered. They had many problems to face. So long as a ton of coal had to be handled, there would be conflicting opinions as to how it should be done; but he had no doubt that the gas engineers in South Wales would succeed in solving all the problems that might present themselves. The industry there was in good and safe hands. Mr. Madden submitted "The Porthcawl Urban District Council," and Councillor Griffin replied.

During the afternoon, the members visited the gas-works, over which they were shown by Mr. S. Walker (the Manager). They saw a 200,000 c.ft. capacity Tully plant, which at present makes 25 p.ct. of the output of gas. The annual production of gas at the works is now something like 43 million c.ft.; while in 1910, it was no more than 11 millions. The works were taken over by the Council in 1915.

Isle of Wight Gas Association.

The annual meeting of the Isle of Wight Gas Association was held on June 16—Mr. F. W. Taylor, Engineer and Manager of the Ryde Gas Company, presiding. Mr. Taylor gave an interesting résumé of his work at Ryde during the past four years. The officers for the ensuing year were then appointed; Mr. F. E. Cox (Engineer and Manager of the Newport Gas Company) being elected President; Mr. H. D. Lumb (Engineer and Manager of the East Cowes Gas Company), Hon. Secretary; and Mr. W. C. Church (Secretary of the Sandown Gas Company) Hon. Auditor. Mr. W. M. Mason, of the British Commercial Gas Association, gave an address on the objects of the National Gas Council of the United Kingdom. After the business meeting, ladies joined the company for tea, which was partaken of by invitation of the Directors of the Ryde Gas Company, whose hospitality was gratefully acknowledged, on the proposition of Mr. Mason, seconded by Mr. H. A. Stibbs (Secretary of the Portsea Island Gas Company). Alderman F. W. Randall, J.P., Chairman of the Ryde Gas Company, suitably replied.

Gas to Fire Sparking Plug Porcelain.

An article has been contributed by Mr. A. G. Wikoff to "Chemical and Metallurgical Engineering," in which is described the firing of the porcelain—one of the most important processes in the making of a sparking plug—at the works of the Champion Porcelain Company, at Toledo (Ill.). In 1919 a Dressler tunnel kiln was installed, of the muffle type, which is always filled with cars—48 in this case—loaded with porcelain. Operation is ordinarily on a one-hour basis—that is, one car is run in, and one withdrawn, every hour, making the time of travel through the kiln 48 hours. The kiln itself is 305 ft. long, with an arched roof, and platforms on each side of the track corresponding in height with the car floors. All the arrangements for heating and cooking are supported on these platforms. The heating zone, which extends from the mouth of the kiln to a point a little beyond the centre, has horizontal combustion chambers on either side. For a distance of about 30 ft. in the zone of maximum temperature these chambers are built-up of double-walled carborundum blocks, assembled in a special trapezoidal form. As the temperature diminishes towards the mouth of the kiln, the chambers are continued, first with fireclay construction, and then with iron pipes in the section nearest the entrance. Combustion takes place near the centre of the kiln, and the products of combustion are drawn through the chamber towards the mouth of the kiln by a fan. As the combustion gases are not permitted to escape into the kiln, the character of the atmosphere there may be controlled as desired. Town gas is used; and the author says it is interesting to note that, so far as is known, this is the only kiln which is operating at from Cones 18 to 20 (2714° to 2786° Fahr.). Being the first to operate at such high temperatures, this kiln has been experimental so far as the refractory lining of the high-heat zone is concerned. For the muffles, carborundum seems to be the only refractory which will give satisfaction. The kiln arch throughout the furnace zone is built of silica brick; and the top and sides are covered with insulating material. During their progress through the heating zone, the cars of ware are brought gradually to the required temperature. The heat exchange between combustion flues and cars is such that, on a one-and-a-half hour schedule (which is sometimes worked), the combustion gases leave the kiln at 480° to 550° Fahr. From the discharge end of the kiln, cool air passes through pipes along the sides, absorbing heat from the convection currents, which are guided by a curtain wall. Preheated air for the burners is obtained in this way, but there is also a considerable surplus which may be used for drying.

A PENSION SCHEME FOR THE STAFF OF A SMALL GAS UNDERTAKING.

By F. G. KINGWELL, Secretary of the Falmouth Gas Company.

[A Paper read at a Meeting of the Cornish Association of Gas Managers on May 30.]

The subject of my paper, though perhaps somewhat alien to the manufacture of gas, provides a thought worthy of careful consideration by those responsible for the administrative side of a gas undertaking; and with a view to maintaining an interest in our meetings and to provide something of a debatable nature, I have penned this brief narrative.

It is certain that pension funds or pension schemes are becoming increasingly popular with employers; and I think the reasons for this are not difficult to find. In the first place, there is a natural feeling that to take the best years of a man's life and eventually to cast him off when his infirmities render him an expensive servant, is so repugnant to the average Englishman that, even where no fund or scheme is in existence, it is generally the rule to make some sort of retiring allowance. At first the men who receive these allowances are few in number; but, as a company expands and increases its staff, so the number grows. Sooner or later it becomes apparent to the management that the question of pensions must be placed on a proper basis.

Personally, I think it should be imperative by law for every employer to provide for old age in the case of faithful employees who oft-times have to work and wait for the mere pittance afforded by the State, and which comes too late in life. Another consideration which is becoming increasingly apparent is that if the best service is to be obtained, the employees should be satisfied and be desirous of remaining in the company's employment.

Although there are many ways of securing continuity of employment, one of the most powerful incentives which can be put forward is the certainty that a suitable provision for old age is assured. It has the advantage from the employers' point of view that it is not a present benefit, but one which is to be granted in the future and will be forfeited by those who leave the service. From the financial standpoint it may certainly be argued that the employers' contribution to the pension fund is an excellent investment, since it results in a much more effective service than could be obtained by merely giving increases in wages.

In the case of smaller undertakings, pension schemes are not practical unless they have the support of the employer, who should be prepared to undertake all the management of the scheme and incidental costs appertaining thereto. Schemes are usually turned down on account of their cost at the outset; but to demonstrate to members of this Association that cost should not debar a scheme from being instituted, I will explain the one which has been introduced by the Falmouth Gas Company—of which I am somewhat proud, as we are undoubtedly one of the smallest undertakings in the country to inaugurate such a scheme, and are certainly the first in the "Delectable Duchy." We have not sought powers under section 10 of the Gas Regulation Act, as we consider this unnecessary; the small cost to the Company being considered deferred pay will be debited to the revenue account as such.

Each fund or scheme has its own characteristics; and it is dangerous for me to give any opinion or lay down any rule as to how one should be instituted. In our own case the scheme is a contributory one and has been undertaken by an insurance company, whose rates were found to be the most generous of a number of offices; the rates quoted being net, and no commission being paid. In return for a fixed premium per man per annum, a fixed annuity, or a cash option, is guaranteed at a given age. There are many advantages of putting the business through an insurance company, the most important of which is that an absolute guarantee is given that every liability will be promptly met—a guarantee that has been sadly lacking in a number of pension funds. Simplicity is another feature, for provided the premiums are regularly paid, no further action need be taken by the parties concerned.

Under our own scheme, the contribution paid by the employee is £5 per annum, and by the employer £5 per annum—£10. And from the following table [p. 800] will be seen the annuity or the cash option payable at sixty (the age decided upon by the whole of the employees, with one exception, at the time of entering the scheme). The premium paid in our case is a minimum one; but there is nothing to prevent any member contributing a larger sum per annum and so obtaining a larger annuity, *pro rata*.

The average age of the whole of the employees is thirty-six, which secures a pension of £32 16s. 7d. at sixty, or a cash equivalent of £354.

Twenty-eight employees have entered the scheme. Two apprentices, four men above the pensionable age (who will be dealt with separately by the Company on retirement), and three casual employees, have been excluded. The apprentices will join the scheme as soon as their period of apprenticeship has expired. I might say at this juncture that the Directors have now made it a condition of employment that any new employee entering the service of the Company must become a contributor to the scheme; and with a view to making the same as profitable as possible to the man, the Manager will endeavour to engage young men when vacancies occur.

Age at Entry.	Deferred Age 60.		Deferred Age 65.	
	Annuity.	Cash Option.	Annuity.	Cash Option.
	£ s. d.	£	£ s. d.	£
21	68 15 3	744	100 16 9	917
22	65 18 7	712	96 7 8	880
23	63 3 2	681	92 13 3	844
24	60 12 1	651	88 17 9	810
25	57 16 7	622	85 8 2	776
26	55 6 0	594	81 18 2	744
27	52 12 7	567	78 8 7	712
28	50 4 2	540	75 0 0	681
29	47 16 1	515	71 17 1	651
30	45 9 1	490	68 7 6	622
31	43 4 10	465	65 7 10	594
32	41 0 6	442	62 10 0	567
33	38 16 8	419	59 11 0	540
34	36 15 0	397	56 17 5	515
35	34 15 7	375	54 1 1	490
36	32 16 7	354	51 7 10	465

The first premiums—both for the employees and the Company—were paid by the Company in full, the man's contribution being deducted from his wages weekly to reimburse the Company, and for which his written authority at the outset was obtained. Two policies are issued by the insurance company, one in respect of the Company's contribution, and one in respect of that of the employee. The Gas Company have complete control over their own policy, with power to withhold payment at any time—*i.e.*, in the event of a man leaving the service of the Company before the pensionable age, or being discharged through inefficiency or misconduct. The man's contribution is a statutory deduction from assessments for income-tax, in a similar manner to the life assurance premiums. In the event of an employee dying, or of the surrender of the policy before the pensionable age, the insurance company returns the whole of the premiums paid *plus* compound interest accumulated at 3 p.ct. per annum.

The total cost of the scheme per annum to my Company is £85 8s., arrived at as follows:

	£	s.	d.
Contribution in respect of 28 employees at £5 per annum	140	0	0
Less—unemployment insurance contribution at 9d. per man per week	54	12	0
	£85	8	0

Exemption from unemployment insurance has been sought and obtained in respect of all the permanent employees of the Company, for under paragraph 1 of Part II. of the first schedule of the Unemployment Insurance Act exemption is granted from the compulsory provisions of the Act to employees:

(*a*) In the service of any public utility company;
(*b*) In which the persons employed are entitled to rights in a superannuation fund established for the benefit of persons in that employment.

The annuities are usually paid in half-yearly instalments, although they can be paid quarterly, if desired, at a slight increase in the cost. Consideration was given to the provision of a fixed pension at the pensionable age—*i.e.*, the pension fixing the premium and not the premium the pension; but as in the case of older employees the premium was found to be excessive, it was abandoned for the scheme now put into operation.

New York and Dollar Gas.

Governor Smith, of New York, on June 2—within the last few minutes allowed him by law—signed what is known as the "Walker Dollar Gas Bill," which not only decreases the price of gas from $1·15 to $1 per 1000 c.ft., but also increases the legal standard from 537 B.Th.U. to 650 B.Th.U. This was on a Saturday, and on the following Monday morning, June 4, the Consolidated Gas Company of New York took the initiative in fighting the new Gas Bill by filing in the Federal Court a 74-page complaint, in a suit to enjoin the members of the Public Service Commission and the Attorney-General of the State from attempting to enforce the provisions of the Bill. The Company point out that the whole of the gas-consuming apparatus in use has been adjusted for the supply of gas of a standard of not less than 537 B.Th.U. on monthly average; and in the case of the Consolidated Company and their affiliated companies the adjustment which the Bill would necessitate would require about six months to make, and would cost at least $400,000. To undertake to deliver immediately gas of not less than 650 B.Th.U. would in many cases be extremely hazardous; and the service would also be unsatisfactory. The Company's statement concludes: "We are utterly unwilling to assume responsibility for the serious hazards which would attend any attempt on the part of our respective companies to comply forthwith with so dangerous a statutory requirement. Loss of life and destruction of property would, in our opinion, be altogether likely to result in numerous instances." Thus, says the "American Gas Journal," while the Walker Bill is law, it is not yet enforced, and probably will not be for at least a year—for it is very likely that the litigation will not cease with the decision of the District Court, but will be carried to the Circuit Court of Appeals, and from there to the Supreme Court of the United States.

MIDLAND JUNIOR GAS ASSOCIATION.

Discussing the Education Scheme.

A Special Meeting of the Midland Junior Gas Association was held at the Council House, Birmingham, last Thursday, to hear an address by Mr. Walter Hole, Organizing Secretary for the Institution of Gas Engineers' Education Scheme. There was a representative attendance, over which Mr. C. F. W. Rendle presided. The latter urged the importance of the scheme; and, on behalf of the Association, gave a cordial welcome to Mr. Hole.

Mr. Hole pointed out that the education scheme was divided into two groups. There was the comparatively restricted class of students who were able, as in Birmingham, to attend technical institutes which took gas engineering, chemistry, and engineering subjects. In this way, the whole of the ground in the scheme could be covered. A youth leaving school at 14 or 16 years of age would, under the scheme, commence a co-ordinated course of training extending over three years. For the first two, the probability was that his studies would be confined mainly to what were called the cognate subjects—in gas engineering, to chemistry and physics; in gas supply, to physics, drawing and the like. Having received a thorough grounding in these subjects, the student would proceed to study gas engineering or supply, *plus* more advanced instruction in the cognate subjects. At the end of the third year, he would be able to sit for his first examination. Assuming that a student successfully negotiated the fence, he would go on for a further two years' course, taking the more advanced studies in the cognate subjects, or, alternatively, other subjects which he may not have touched in his first-year course. This course would run for a further two years—five years in all; and the student would then be in a position to sit for the higher certificate.

There was a large number of approved technical institutes which, while taking chemistry, physics, engineering, drawing, &c., did not include in their curricula gas supply or gas engineering. Last winter there were only thirteen centres in the United Kingdom in which gas subjects were taught; and a considerable proportion were in very restricted areas. If they excluded the London, Lancashire, Yorkshire, and Birmingham areas, the remainder of the country was not touched by institutes which included gas subjects in their curricula. This fact created a difficult position with the Board of Education, because no scheme could be submitted which left so many districts untouched. The scheme provided, under section 2, that any student who had not been able to obtain tuition under such conditions might apply to the Secretary of the Institution of Gas Engineers for examination at any time when an examination was coming on. These examinations would be of equal standard with those arranged for under the main scheme, and would be arranged by the Advisory Board, and probably superintended by the District Association covering the particular area. The only difference was that the certificate would not be endorsed by the Board of Education. It would, however, have real value by reason of the endorsement of the Institution of Gas Engineers. It was hoped that the higher students would be presented at the annual meeting of the Senior District Association.

Finally, there was the diploma examination, this being intended for those who were aiming at the highest administrative positions which the industry had to offer. A man aiming at becoming a gas engineer must be well acquainted with the supply side of the industry, and a man aiming at obtaining a diploma in supply ought to be well acquainted with the general details of gas manufacture. Moreover, he must have a certain minimum of general education—the University matriculation standard, or, alternatively, the school leaving certificate A or B. At least the latter must be held. A man must have attained the age of 23 before sitting for the highest certificate; and he would be required to write an original thesis on some aspect of his daily work.

Mr. Hole concluded by urging that if they meant to maintain and improve the status of the industry, those engaged in it must be thoroughly efficient. Remuneration would increase as status advanced.

Discussion.

Mr. LUKE STURDY (Birmingham) inquired if those who were to conduct the examinations would be themselves adequately qualified. [Laughter.] If much more were to be demanded from men on the technical or academic side, it seemed to him that the question of remuneration would have to be reconsidered.

Mr. HOLE pointed out that it was not necessary that those now in the industry should go in for the examinations, though it might be desirable for many to do so. This was for themselves to determine. He thought that before long the holding of the diploma would be a condition of membership of the Institution of Gas Engineers. He believed that higher remuneration would follow increased status. The inexorable law of supply and demand entered. There was far too much capital invested in the gas industry to allow highly-qualified men to be underpaid.

Mr. STURDY suggested that as some of them already possessed certificates, an equivalent certificate should be given them, without re-examination, by the Institution of Gas Engineers. [Laughter.]

Mr. W. E. CADWALLADER (Birmingham) asked if there were anything in the scheme in relation to gasfitting.

Mr. HOLE replied that gasfitting was recognized as a special branch, and, like the commercial side, was not included. A scheme was being evolved dealing with the training of men engaged on the commercial and sales sides.

Mr. A. WHITEHOUSE (Birmingham) thought that, in addition to the

ordinary examination, there should be a *viva voce* examination. Correspondence-coached students, he suggested, were not usually sufficiently in contact with the subject.

Mr. HOLE said he appreciated the objections that could be raised to correspondence tuition; but, after all, something must be done to meet the difficulty of men who were situated far from technical institutes. While agreeing as to the importance of the *viva voce* examinations, it must be remembered that, as the examinations would be conducted by local committees, difficulty might be experienced in securing absolute uniformity. There would, of course, be the *viva voce* examination for the diploma. They were approaching the administrators of the gas industry—corporations, committees, and boards of directors of companies—with a view to obtaining from them a promise that definite facilities for training would be given to promising students on their staff.

Mr. W. J. PICKERING (Birmingham) observed that if the industry were to cope with the competition which was bound to come, the rank and file of those engaged in it must equip themselves better on educational lines.

Mr. R. J. ROGERS (Birmingham) regarded the scheme with feelings of satisfaction. A question had been asked as to what the rewards would be for this additional technical equipment. Human nature being what it was, one must recognize that a man did require some encouragement. The earliest opportunity should be shown by the administrators in the gas industry that they were prepared to take up this scheme in some practical way, so that it might be of benefit to those who entered into it. This point should be pressed strongly, because it was the administrators who could make or mar such schemes. He thought that, in the main, they would agree as to the value of the *viva voce* examination. He appreciated, as an examiner in gasfitting, the difficulty there would be in getting uniformity in such examinations—one local examiner took a standard different from that of another. As to gasfitting, they insisted upon the candidates' work being examined on the district, to make certain that the candidate was a practical gasfitter. If something of this kind could be embodied in the scheme—he knew it was incorporated to some extent—it would be an important factor.

Mr. HOLE observed that, in their letter to those engaged in the gas administration of the country, they asked for their co-operation by encouraging the younger men in their employ to take advantage of higher and technical education, and to offer to them the fullest possible facilities for the pursuit of their studies. The facilities desired were the concession of a few hours' leave—say, one half-day per week—for attendance at day-time classes, and financial assistance in the reimbursement to the student of travelling expenses or class fees (wholly, or, in part, according to diligence shown).

Mr. R. G. MARSH (Birmingham) asked if it was essential that there should be a delay of two or three years between the first and second examination, and would the examinations, with certificates, be continued under the auspices of the City and Guilds.

Mr. HOLE stated that neither gas supply nor engineering would be included in the City and Guilds' curriculum, as the Gas Institutions' scheme would come into operation next winter. There would be no City and Guilds' examination in the future. The next examination, in April or May, would be that by the Institution of Gas Engineers. It was not necessary that there should be delay between the first and second examinations; but generally it was desirable.

Mr. WILBERFORCE (Wolverhampton) pointed out that in many provincial towns distribution was taken jointly with the showrooms. Was it essential, in such circumstances, that the men concerned should go for a full course of gas engineering?

Mr. HOLE took the view that a knowledge of gas engineering was necessary.

Mr. J. HEWETT (Birmingham) said he was requested by Mr. A. W. Smith, the General Manager of the Birmingham Gas Department, to apologize for his absence. He took a great interest in the efficiency of his staff, and he desired him (Mr. Hewett) to mention that the Birmingham Gas Committee recognized in a practical way the technical advances made by members of their staff. He added his own belief that the scheme would have an excellent effect on the technical training of men, and particularly of those entering the industry. The scheme would serve to bring ability to the notice of gas administrators, and he believed ability would generally be recognized.

The CHAIRMAN stated that in the early autumn a supreme effort would be made by the Midland Junior Association to obtain a larger membership; and then it might be possible to urge the claims of the education scheme. He moved a vote of thanks to Mr. Hole for his informative address.

Mr. L. H. THOMAS (Senior Vice-President) seconded; and the resolution was carried.

Mr. HOLE, in acknowledgment, said he would be glad to attend a meeting in the autumn. He believed the scheme would be of immense value to employees, and that it had a real "bread-and-butter" significance. He would do all he could to fight apathy and indifference.

Will.—Captain George Everard Gibbons, D.F.C., M.M., of Stourbridge, firebrick manufacturer, left estate of the gross value of £2130.

Different Coloured Meters.—A "wrinkle" from the "Gas-Age Record:" In the case of a small gas company, where clerical work has always to be kept at a minimum, it will help to keep your old-age meter list down if you will paint the meters a different colour for each year. A good colour scheme is—1923, cream; 1924, yellow; 1925, orange; 1926, light tan; 1927, red; 1928, purple; 1929, black. Then repeat. Blue is left out of this scheme, as it is generally the colour of the new meters. In order to designate the new meters, do not paint the whole meter, but just the round name plate in front which most manufacturers leave bright. Wagon paint is good enough for this purpose, where the colour goes on over the original enamel. It costs about half as much as meter enamel. Never try to use house paint—it is worthless for meters.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Therms per Ton.

SIR,—No one can question the wisdom of the slogan "We shall see before we follow," which Mr. Harry Jones so aptly introduces in his further letter to you on this interesting subject.

Mr. Jones speaks of gas undertakings going up in quality. In my view, this is but a passing phase. Those engineers familiar with 500 B.Th.U. gas and unfamiliar with 250, cannot very well discuss the question of quality, much less consider the adoption of gas of anything like half their present calorific value. It may be remarked that, in spite of a few perhaps notable gas undertakings raising the quality of gas, fresh heating problems are being solved every day by gas of very low calorific power Gas engineers who are supplying 400 B.Th.U. gas are the people who know what it is doing. So far high-grade gas people score because they obtain a better price per therm for it. Whether the consumer gets as good a service or not, is another matter—at present.

Until men were seen flying in them, aeroplanes did not exist. Gas engineers are casting about for a quality of gas which will enable them to supply heat to the domestic and industrial user at a price that would show some advantage on coal costs. Such a quality does not exist until there is abundant proof in practice.

Mr. Jones has shown that the London Companies' selling price of gas is, roundly, 10d. to 13d. per therm. The net cost of coal—*e.g.*, coal carbonized less residuals—2¼d. to 4d. per therm (Bath being 1¼d.). Is not the difference between the net cost of the raw material coal and the selling price of the resultant gas too great? Four times the cost of the coal is charged for the gas. So far as the accounts of gas undertakings go, such price is seen to be warranted; but I submit that the "other-charges" outside coal, necessitating such a price, require the most serious attention of the industry. It is wrong for the industry to assume that, because the accounts of a gas undertaking warrant such a price being charged, the process of gas-making is right.

A ton of good coal costing (say) 30s. contains 300 therms. In gas, 300 therms at 10d. represents £12 10s. For the gas industry to have to acknowledge—as in truth it has to do—that to obtain 70 therms in the form of gas "takes some doing," is a little reflection on present processes or something.

There are old-established firms prepared to guarantee about 250 therms or thereabouts from a ton of good coal used in gas producers, which means that the gas would cost, with coal at 30s. per ton, 1¼d. per therm "all in." Can rich town gas hold its own in heating and power propositions with the producer figure? There is far too great a difference between the cost of a therm in producer gas and a therm in town gas of (say) 500 B.Th.U. The reason for this difference should be discoverable by some one of the many men engaged in a great industry.

I claim that it is discovered. If the industry would but work from the low end of gas quality—for over a hundred years it has worked only from the high end—town gas, including producer gas, would compete with coal in practically every use, domestic and industrial.

The production of coke is very largely the test of the whole gas-making system of the present. If it can be proved that coke production is not only necessary, but that it pays gas undertakings to produce it, then, and then only, the present system will live. We shall see!

GEORGE HELPS.

Nuneaton, June 21, 1923.

Water Heating in Houses.

SIR,—On page 658 of your issue for June 13, referring to electric demonstration houses, you take exception to the "dual method of doing one job" (water heating by coal-heated range and electric circulator) as necessitating increased installation cost and high cost to produce the required results. On turning to p. 666 of the same issue, in describing "model equipment" in Becontree Heath houses, I find it stated that "a gas-heated circulator is connected to the coal-range boiler behind the living-room fire; the circulator being employed to speed the hot-water service." These contradictory statements in the same issue of the "JOURNAL" appear a trifle inconsistent.

It is obvious that the electric circulator in the Manchester electric house was installed, not to boost the hot-water supply from the coal-heated range, but to provide an alternative means of supply, when the range was out of use—*e.g.*, during the summer months. In all probability this is the real purpose of the gas-heated circulator at Becontree Heath. Both types of apparatus may serve a useful purpose in this respect; but I accept without question your statement (p. 658) that "if the coal-heated range is large enough, and the boiler of sufficient capacity, adequate supplies of hot water will be forthcoming," without any assistance either "electrical" or "gas."

R. HARDIE.

Glasgow Corporation Electricity Showroom,
251, Sauchiehall Street, Glasgow, June 25, 1923.

Gas Price Reduction.—Strabane (Co. Tyrone) Urban Council have reduced the price of gas by 9d. to 7s. 9d. per 1000 c.ft. This makes a total reduction of 1s. 6d. within the past year.

Horncastle Gas Schemes.—Mr. R. Achurch, Chairman of the Horncastle Gas Committee, on Thursday last strongly advised the Council to proceed with the installation of a Tully gas plant to cope with the coming winter's demand. Unless steps were taken immediately the town would be in darkness in a few months' time—a misfortune which would seriously influence the future of the Gas Department. It was pointed out that unless the work was commenced at once, those consumers who used gas for power purposes would be lost. The Surveyor was appointed to supervise the estimates.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Progress of Bills.

Hoylake and West Kirby Gas and Water Bill: Returned from the Commons, with the amendments, agreed to.

Rawmarsh Urban District Council Bill: Reported, with amendments.

The further Standing Orders applicable to the Barnsley Corporation and Birkenhead Corporation Bills have been complied with. These Bills have been read a second time, and committed.

A petition has been deposited on behalf of the Barnsley Gas Company against the Barnsley Corporation Bill.

HOUSE OF COMMONS.

Progress of Bills.

South Staffordshire Mond Gas Bill: Read a second time, and committed.

Torquay Corporation Bill: Reported, with amendments, from the Local Legislation Committee.

Oakham Gas and Electricity Bill: Reported, with amendments.

South Elmsall and District Gas Bill: Reported, with amendments.

A petition has been deposited on behalf of the Southampton Gas Light and Coke Company against the Southern Railway Bill.

The Standing Orders not previously inquired into which are applicable to the Macclesfield Corporation Bill have been complied with.

Public Utility Companies (Capital Issues) Act.

A copy was presented of a report on an application by the Newark Gas Company to the Board of Trade under the Act.

Gas Regulation Act.

Copies were presented of draft Special Orders proposed to be made by the Board of Trade under the Act, on the application of the Milton Regis Urban District Council and the Torquay Gas Company.

Motor Spirit.

Sir P. LLOYD-GREAME had the following answer circulated in the Official Report of June 19, in reply to a question by Mr. Hardie, who desired to know the total number of gallons of motor spirit, including benzole, used in the British Isles in 1914 and 1922, and the total number of gallons of home-produced benzole used as motor spirit in the same period:

As nearly as can be estimated, the quantity of motor spirit, including benzole, consumed in the British Isles in 1914 and 1922 was—

	Gallons.
1914	141,723,127
1922	306,502,753

The quantity of home-produced benzole used as motor spirit in the British Isles was:

	Gallons.
1914	17,713,227
1922	11,155,756

It may be added that the figures for 1913, the last complete pre-war year, were:

	Gallons.
Motor spirit	117,524,421
Including benzole	12,265,411

The consumption has been calculated by adding together the imports of petrol and benzole, and the home production of Scotch shale spirit and benzole, and deducting the exports. The figures for benzole used as motor spirit are necessarily only approximate.

SOUTH ELMSALL AND DISTRICT GAS BILL.

The Unopposed Committee of the House of Commons, presided over by Mr. J. FITZALAN HOPE (Chairman of Ways and Means), last Wednesday ordered this Bill [see "JOURNAL," Feb. 14, p. 386, and May 16, p. 436] to be reported for third reading.

Mr. WILLES JOHNSON (Messrs. Torr, Durnford & Co., Parliamentary Agents) explained that the purpose of the Bill was to incorporate the South Elmsall and District Gas Company, for the purpose of taking over an undertaking in South Yorkshire (which was originally authorized by a Board of Trade Order in 1900) in the hands of an individual. About nine years later, with the approval of the Board of Trade, in pursuance of the terms of the Order, the undertaking was transferred to Mr. R. Porter and Mr. S. B. Beaumont; and from 1909 these gentlemen carried it on until 1921, when both died, and their widows continued as their representatives. In July, 1922, Mrs. Porter and Mrs. Beaumont, not being in a position to manage the undertaking, and wishing to wind up the estates, were authorized by the Court to continue, with a view to selling the undertaking as a going concern. At that time, about £28,000 had been spent on capital account, and considerable additional capital was required on account of the increased demand for gas. The ladies, however, were unable to find the additional capital. In October, 1922, the promoters of this Bill offered to buy the concern. As a result, a provisional agreement was come to for the purchase of the undertaking for £26,750, together with some further payments, including compensation to the Secretary of the works. The agreement was made subject to the approval of the Court and the sanction of Parliament. In October last the Court had approved of the agreement

The limits of supply were to be extended under the provisions of the Bill, in order to include neighbouring parishes; and the capital proposed was £50,000 in all—made up of £30,000 original capital, and £20,000 additional. The original, which would be subscribed in cash, would be applied in paying the purchase money, compensation, and other sums payable under the agreement, and the costs in connection with the agreement and the Bill. These sums, together with amounts which had been spent on the undertaking since October last, would exhaust the original capital. The further £20,000, together with loan capital of £9000 in respect of the original capital, and the usual one-third in respect of the additional capital paid up, would make a total share and loan capital of £65,666.

The CHAIRMAN asked who Mr. Ellison (who was to become one of the proprietors) was.

Mr. WILLES JOHNSON replied that Mr. Ellison was a gentleman who had for some years past been interested in many gas undertakings in the West Riding of Yorkshire. He had on previous occasions obtained statutory powers, both by Act and Order, in connection with these undertakings, which were carried on, generally speaking, extremely successfully. He had made an offer to the South Elmsall undertaking which was accepted, and which had been approved by the Court. The local authority had opposed this Bill in the House of Lords originally, and had raised a great number of objections to the proposals. They had been advised by competent engineers and others. The promoters had gone very fully into the whole matter with them, had met them on certain points, and had satisfied them. Their Engineer was satisfied, in the first instance, that the price offered was a reasonable one; and Mr. Ellison was as in as good a position as anybody else to judge what the undertaking was worth, having regard to his experience.

In reply to the CHAIRMAN, Mr. Willes Johnson said he did not know that Mr. Ellison had bought similar undertakings in the West Riding; he had started them in most cases. In reply to another question, he said that Mr. Porter, who had carried on the undertaking from 1909 until 1921, was an experienced gas manager.

The CHAIRMAN asked how the capital was to be raised.

Mr. WILLES JOHNSON replied that the additional capital would be raised in the ordinary way, subject to the Auction Clauses. The original capital would be subscribed for in cash in full, either by Mr. Ellison or his nominees. In reply to Sir ERNEST MOON, K.C. (Speaker's Counsel), he said the original shares would be allocated to Mr. Ellison.

The CHAIRMAN asked whether they would have preferential rights.

Mr. WILLES JOHNSON said they would not; but there was a higher rate of dividend payable on part of the original capital. As to £7540 of that, the maximum dividend was 10 p.ct.; and as to the remaining £22,460, 8 p.ct. The maximum dividend on the additional capital would be 8 p.ct. on the ordinary, and 7 p.ct. on the preference. The £7540 was to be entitled to the higher dividend because this was the amount of the existing original capital which, under the Order of 1900, was entitled to 10 p.ct.

Asked whether there were the usual sliding-scale proposals, Mr. Johnson replied that there were not. The therm maximum price fixed in the Bill (15·4d.) was the same as that fixed, in relation to the undertaking as it now exists, by the Board of Trade under the Gas Regulation Act. In 1922 the then owners had applied for a therm Order, and the standard price was fixed by the Board of Trade. As a matter of form, the promoters repealed that Order by this Bill, but fixed the same figure as the maximum price. In pursuance of a Board of Trade report, they had put off fixing a standard, and were incorporating a provision whereby an application could be made through the Board later for a standard price and sliding scale. This was the usual course. The conditions were such that a standard could not fairly be fixed now, and the provision was that at any time after two years, application could be made for it. Of the remaining capital which would be available, some £14,000 will have been spent by about March next. There was a considerable development in this area. Some 700 houses had been built which required gas, and were being fitted up. The capital asked for, therefore, was quite reasonable, and would probably be exhausted in 10 or 12 years.

Dealing with a report by the Board of Trade, Mr. Johnson said this suggested that the Committee should satisfy themselves that the 8 p.ct. dividend on the additional capital was necessary. The Board pointed out that the standard rate commonly authorized was 7 p.ct. It was true that before the war the standard rate on additional capital was 7 p.ct. If this was reasonable under the conditions then existing, it seemed that 8 p ct. was extremely reasonable now under the different conditions. The additional capital was subject to the Auction Clauses, so that it did not make much difference whether it was 7 or 8 p.ct., except that if the rate were 7 p.ct. the probability was that the capital would have to be issued at a discount, which was undesirable.

The CHAIRMAN said that under the Auction Clauses they got their money according to the price at the time.

Mr. JOHNSON agreed, and reiterated that under the Auction Clauses the only difference between the two rates was as to whether the money was raised at a discount or at a premium. It came to the same in the end; but it was undesirable to risk the discount. In fact, the Board of Trade itself, under departmental orders, had authorized a rate of 8 p.ct. on preference stock.

The only amendments made to the Bill were merely drafting amendments.

Mr. W. H. CLOUGH (Solicitor for the Bill) proved the preamble; and the Committee decided as stated.

OAKHAM GAS AND ELECTRICITY BILL.

This Bill [see "JOURNAL" for May 2, p. 297, and June 13, p. 681] was further considered by the Unopposed Committee of the House of Commons, presided over by Mr. J. FITZALAN HOPE (Chairman of Ways and Means), on Wednesday of last week.

Mr. SEDGWICK (Messrs. Rees and Freres, Parliamentary Agents) put forward for acceptance by the Committee an amendment to meet

their point (raised at the last sitting) in regard to the purchase clause in the Bill. This clause provided that if the local authority exercised their right under the Electric Lighting Act to purchase the electricity undertaking of the Oakham Gas and Electricity Company (at the end of 42 years, or subsequent periods of 10 years), they should be under an obligation to purchase the gas undertaking at the same time. There being no precedent for this provision, the Committee desired it to be made clear in the Bill that the clause was granted owing to the special circumstances. Consequently, Mr. Sedgwick proposed that the following be inserted at the beginning of the purchase clause:

> Whereas it is intended that the electricity to be supplied by the Company under the provisions of this Act shall be generated by means of gas manufactured at the Company's gas-works, and the generating plant will be situate within the area occupied by the works for the manufacture of gas; and whereas it is therefore expedient that if the local authority desire to purchase the electricity undertaking in pursuance of the provisions of the Electric Lighting Act, 1888, they may, and shall, at the same time purchase the gas undertaking of the Company; and whereas the local authority has approved of the provisions of this section; be it therefore enacted . . .

Then follow the provisions of the clause, as already mentioned.

The amendment was accepted, and the Bill ordered to be reported for third reading.

RAWMARSH URBAN DISTRICT COUNCIL BILL.

The Unopposed Committee of the House of Lords, presided over by the Lord Chairman, the EARL OF DONOUGHMORE, on Tuesday of last week, ordered this Bill [see "JOURNAL" for Feb. 14, p. 386, and May 9, p. 358] to await report for third reading. There are no amendments of any moment to the gas provisions since the Bill left the House of Commons.

REGISTER OF PATENTS.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for June 20.]

Nos. 15,154—15,723.

BELL, G.—"Apparatus for removing coke from retorts." No. 15,588.

BROTHERHOOD, LTD., P., and BRYANT, C. W.—"Manufacture of gases." No. 15,715.

BURGLIN, A. L.—"Atmospheric vapour burners." No. 15,542.

CARR, H. O.—"Extracting and recovering benzole, &c., from coal, &c., gases." No. 15,705.

CERASOLI, A.—"Continuous fuel distillation retorts." No. 15,630.

CYPRZIRSCH, A.—"Devices for utilizing heat of exhaust gases." No. 15,616.

DEMPSTER, LTD., R. & J.—"Gas-diverting valves for gas purifiers, &c." No. 15,582.

FILDES, T. R.—"Geysers." No. 15,683.

GREENE, O. V.—"Gas cleaning apparatus." No. 15,315.

HENRY, A. R.—"Guards for cocks, taps, &c." No. 15,498.

HUGHES, W.—"Gas-stove hot-water system." No. 15,280.

HUME PIPE COMPANY (AUSTRALIA), LTD.—"Pipe joints." No. 15,214.

HUMPHREYS & GLASGOW, LTD.—"Manufacture of gas." No. 15,212.

JONES, J. W.—"Means of drilling and tapping holes." No. 15,460.

LIDDLE, A.—See Hughes, W. No. 15,280.

LINE, A. J.—"Liquid-control valves." No. 15,577.

MASCHINENFABRIK AUGSBERG-NURNBERG AKT.-GES.—"Sealing liquid collectors of disk gasholders." No. 15,532.

MASCHINENFABRIK AUGSBERG-NURNBERG AKT.-GES.—"Gasholders." No. 15,533.

MASCHINENFABRIK AUGSBERG NURNBERG AKT.-GES.—"Ladder-like apparatus for access to gasholders, &c." No. 15,647.

MUIRHEAD, A. E., J. G., and M. A.—"Lighting and heating apparatus." No. 15,291.

PRYKE, H. E.—See Burglin, A. L. No. 15,542.

RIDE & BELL, LTD.—See Bell, G. No. 15,588.

RODGER, W. F.—See Dempster, Ltd., R. & J. No. 15,582.

ROGERS, F. H.—See Greene, O.V. No. 15,315.

RUSBY, J. M.—See Humphreys & Glasgow, Ltd. No. 15,212.

TITUS LIGHT & RADIATOR COMPANY, LTD.—See Burglin, A. L. No. 15,542.

WITHERS, J. S.—See Hume Pipe Company (Australia), Ltd. No. 15,214.

Cheaper Gas at Clitheroe.—The Clitheroe Town Council have sanctioned a reduction from 4s. to 3s. 6d. per 1000 c.ft. in the price of gas.

Padiham Gas-Works Profit.—For the year ended March 31, the Padiham gas undertaking made a profit of over £6000. At the next Council meeting, a substantial reduction in the price of gas will be recommended.

Arbroath Gas-Works.—The financial result of the past year's working at the Arbroath Gas-Works showed a gross profit of £13,426. From this sum, £7882 was deducted for annuities, &c., leaving a net balance of £5544. This sum was applied to write-off the overpaid balance of £5426 on the previous accounts; and a credit balance of £297 was carried forward. The result permitted of a reduction in the price of gas for the current year of 5d. per 1000 c.ft.

LEGAL INTELLIGENCE.

EDINBURGH TRADERS AND THE GAS CORPORATION.

Sheriff Orr Makes Avizandum in Test Action.

Counsel on Monday of last week, in the Edinburgh Sheriff Court—Sheriff Orr on the bench—further debated the legal points in the test action raised at the instance of John Keppie Paterson, J.P., and other traders against the Corporation of Edinburgh.

It will be recalled that, as previously reported [*ante*, pp. 360, 491], pursuers define themselves as electors in the city of Edinburgh, and they crave the Court to ordain the defenders to give them access to the municipal books and abstracts for the purpose of inspection and examination. They particularly and specifically object to an entry in the abstract of accounts of £4063 10s. 2d., under the heading of "gas-fires, meters, &c.," for the year ended May 15, 1922, and maintain that this figure should be increased to the sum of £17,508 4s. 11d. The latter total, they aver, would have represented the amount of hire at reasonable rates of such gas appliances supplied to consumers as were hired gratuitously or at inadequate rates. The pursuers seek to have the defenders ordained by the Court to set forth distinctly, and with reasonable fullness, the debit and credit obligations in relation to the carrying on of the showrooms in the city of Edinburgh connected with the supply of gas.

On behalf of the pursuers, Mr. MORRICE MACKAY, K.C., continued his argument. At the outset, he read the correspondence which had taken place between the agents on either side to show that the request for the pursuers to inspect and examine the books and accounts of the defenders had been distinctly and definitely refused. He argued that the pursuers were entitled to hold that the defenders had not produced accounts in the sense that the late Lord Guthrie, in the case of Eadie, held should have been done. Defenders had only produced abstracts. Counsel maintained that it would not do for the Gas Corporation of Edinburgh and Leith to say: "These are the accounts, and that is all you can get." Accordingly, he asked the Sheriff to pronounce an order entitling the pursuers to examine and inspect the accounts. He contended that they had taken the complete remedy in bringing this action. It was not whether or not the accounts were accurate, but whether they were legal or illegal. They had, at any rate, stated a case for inquiry. There were express provisions as to what they should have access to in each branch of revenue and expenditure. Instead of that, they had gas-fires included under the heading "Gas-fires, &c." They wanted to see what was the cost of everything under gas-fires, including advertising, and so on. The expenditure should be differentiated from the revenue, and not concealed under "&c." An enormous sum was spent on showrooms which were giving no adequate return to the public. He asked his Lordship to repel the special pleas, which he supposed meant that certain appliances were supplied on specific terms and conditions in return for, or in consideration for, their use. His submission was that it was not within the powers of the defenders to lend for hire by saying they did not charge anything—that what they did get was consideration in the amount paid for the gas consumed. The defenders did not differentiate the charge made under the hire system and to consumers who did not hire. With regard to the objection put forward that they had adopted an improper and incompetent method in bringing forward their case, and on this account the action should be dismissed, he maintained that they had taken the only way that was open to them. He therefore asked his Lordship to ordain the defenders to give them right of access to the accounts for examination and inspection; and after three or four days' inspection, if they were dissatisfied with any item in the complaint, that they should be granted a proof.

Mr. D. P. FLEMING, K.C., replied on behalf of the defenders. At the outset he put before his Lordship the fact that the pursuers were not entirely disinterested electors coming forward in the interest of the community. They were all interested in the trade, and were competitors in business with the Corporation, though they had not any less rights as electors. His Lordship was asked by the pursuers to sustain their objection to the sum of £4063 10s. 2d., or such other sum as would have represented the amount of hire at reasonable rates of such appliances supplied to consumers of gas as were hired gratuitously or at inadequate rates by them; and they asked for detailed entries with regard to the showrooms. His position was that they had been given access to the statutory accounts with complete statutory requirements; and he maintained that the pursuers had not stated a relevant inquiry. He had never disputed the right of the pursuers to get the abstract of accounts. The demand of the pursuers was limited to the demand under the Statute, and what the defenders objected to was that the pursuers should get the books, which was exactly what happened in the Glasgow case of Eadie. He maintained that the abstract of accounts which the pursuers had received complied with the statutory requirements in every respect. The elector was not entitled to access to the books in which they kept their accounts. These books showed the result of the different transactions in the year for which they stood; and it was a matter for the discretion of the Corporation how they were to be presented. The abstract of the accounts was a book containing the accounts of all the separate municipal departments bound together; and he pointed out that the accounts relating to the gas department contained all the details provided for in section 145 of the statute, including the details of revenue and expenditure. If they compared the accounts with the statutory clauses, they would find that they complied with the provisions of the Act. Possession of the books would be very valuable to the pursuers from a trade point of view, as they would get much information as to what price the Corporation paid for certain articles. The £15,000 to which his learned friend had alluded as a suspiciously large sum was the general expenditure of the management of the Corporation to which the gas department contributed its quota, and had nothing to do with the cost of the gas-cookers. Under the showrooms appeared the wages of the fitters, clerks, &c., the rates paid for the occupation

of the showrooms, insurance premiums, &c. It might be said these entries showed that money had been illegally spent; but it could not be urged that there had been any attempt to conceal it. The whole thing was shown on the face of the accounts; and if his Lordship held that the method of dealing with the appliances was illegal, it seemed to him that there was sufficient to determine the question. To order a proof for the investigation of the accounts would be to ask his Lordship to deal with a very difficult problem, requiring an extensive proof and the fixing of the amount at which these appliances were sold. The section did not apply to that question. The purpose of the provision was to give the Corporation power to supply and maintain the appliances with which the gas might be used on such terms and conditions as might be agreed upon between the Commissioners and the persons to whom they were supplied. This did not necessarily mean specific prices; and one of the conditions was that they used the gas in sufficient quantity to make it profitable and worth while for the Commissioners to supply it. These were not gratuitous terms.

Sherriff ORR made avizandum; and his decision may be expected before the end of the present session.

MISCELLANEOUS NEWS.

GAS REGULATION ACT APPLICATIONS.

The following further notices have appeared in the "London Gazette" with regard to applications to the Board of Trade for Orders under the Gas Regulation Act.

Ashborne Urban District Council.

The maximum price now authorized in respect of the supply of gas by the undertakers is 5s. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. per therm.

It is also proposed that an additional charge of 2d. per therm should be authorized in respect of gas supplied through a prepayment meter, and that modifications should be made in the charges authorized in respect of gas supplied outside the urban district of 1s. 1·2d. per therm, instead of 5s. 6d. per 1000 c.ft.

Bungay Gas Light and Coke Company.

The maximum price now authorized in respect of the supply of gas by the undertakers is 5s. 10d. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 9d. per therm.

Coalville Urban District Council.

The maximum price which the undertakers are authorized to charge is 4s. 8d. per 1000 c.ft.; and the price which they propose should be substituted for this is 1s. 8d. per therm.

Newquay (Cornwall) Gas Company, Ltd.

The maximum price now authorized in respect of the supply of gas by the undertakers is 6s. per 1000 c.ft.; and the price which they have asked the Board of Trade to substitute for this is 1s. 4d. per therm.

Shipley Urban District Council.

The maximum price now authorized in respect of the supply of gas by the undertakers is 5s. 5d. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 2½d. per therm.

It is also proposed that an additional charge of 1d. per therm should be authorized in respect of gas supplied through a prepayment meter.

St. Ives (Cornwall) Corporation.

The maximum price now authorized in respect of the supply of gas by the undertakers is 5s. 6d. per 1000 c.ft.; and the price which they have asked the Board of Trade to substitute for this is 1s. 7d. per therm.

It is also proposed that an additional charge of 3d. per therm should be authorized in respect of gas supplied through a prepayment meter.

Borough of West Bromwich.

The maximum price now authorized in respect of the supply of gas by the undertakers is 4s. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 2d. per therm.

SPECIAL ORDERS.

Eastbourne Gas Company.

Application is to be made by the Company for a Special Order under section 10 to extend the limits of supply, to empower the purchase by agreement of additional lands, to borrow further money, to regulate the supply of gas, and for other purposes.

Melksham Gas Light and Coke Company, Ltd.

The Company are to apply for a Special Order under section 10 to define the limits within which they are authorized to supply gas as described in the Melksham Gas Order, 1886, to acquire additional lands, to raise further capital, to grant pensions, to regulate the supply of gas, and for other purposes.

Nelson Corporation.

Application is to be made by the Corporation to the Board of Trade for a Special Order under section 10 to enable them to utilize additional lands for gas-works purposes, to regulate the supply and use of gas, to borrow money, and for other purposes.

Newquay (Cornwall) Gas Company, Ltd.

Notice is given by the Company of their intention to apply for a Special Order under section 10 to empower them, by agreement, to purchase and deal with additional lands, to make provision for the application of a standard price for gas, to raise further moneys, and to regulate the supply of gas.

Tynemouth Gas Company.

The Company are to apply for a Special Order under section 10 to amend section 9 of the Tynemouth Gas Act, 1904, to increase the existing borrowing powers, to regulate the supply of gas, and for other purposes.

DECLARATIONS OF CALORIFIC POWER.

Abergavenny Corporation.—450 B.Th.U. (Oct. 1.)
Haslemere and District Gas Company.—470 B.Th.U. (Oct. 1.)
Northampton Gas Light Company.—470 B.Th.U. (July 1.)
Settle Gas Company, Ltd.—530 B.Th.U. (July 1.)

GAS REGULATION ACT ORDERS.

We have received from the Director of Gas Administration copies of the following further Orders made by the Board of Trade under section 1 of the Gas Regulation Act.

Bridgend Gas Company.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 16d. per therm. (June 19.)

Sandown Gas and Coke Company, Ltd.

After the declared date, the standard price in respect of gas supplied by the undertakers shall be 19d. per therm.

For the purpose of ascertaining the authorized rate of dividend, any price charged per 1000 c.ft. before the declared date shall be rendered into the equivalent price per therm by dividing it by four and one-half.

After the declared date, the word "therm" shall be substituted for the words "1000 c.ft." where they occur in section 21 (fixing maximum price of gas, with sliding-scale as to dividend) of the Sandown Gas Order, 1878, as confirmed by the Gas and Water Orders Confirmation Act, 1878. (June 19.)

SOUTHPORT CORPORATION GAS DEPARTMENT.

Annual Report.

In his annual report, Mr. John Bond (Gas Engineer and Manager to the Southport Corporation) records an increase in the consumption of gas amounting to 6,563,000 c.ft., which is equivalent to 1·05 p.ct. when compared with the figures for the year ended March 31, 1922. Of the total gas made, 661,879,000 c.ft., that sold to private consumers represented 582,825,800 c.ft.; that used in public lamps 43,118,700 c.ft.; 86,700 c.ft. was supplied free; and the gas used at the works, offices, &c., amounted to 12,283,010 c.ft. The gas has been supplied in accordance with the statutory requirements (500 B.Th.U. per c.ft.). The prepayment system accounted for 18·04 p.ct. of the gas supplied—a decrease of 2 p.ct. on last year's figures. The average price received was 3s. 10·09d. per 1000 c.ft., as compared with 4s. 11·29d. for the previous year. The net capital indebtedness at March 31 was £118,474, equivalent to 3s. 9·42d. per 1000 c.ft. of gas sold. The result of the year's working shows a gross profit of £29,431, compared with £6603 for the previous year. As, however, in the previous year £11,261 was required for interest and sinking fund, there was a debit balance of £4422. This debit reduced this year's gross profit to £25,009, which has been disposed of as follows: Interest, sinking fund, and repayment of instalment loans, £13,198; revenue contributions to capital outlay (Butts-lane railway siding), £1268; and the contribution of £10,000 to vertical retorts and telpher plant. This leaves a disposable surplus of £543 to be carried to next year's account.

The number of gas-cookers which are the property of the Corporation in use at the end of the year was 11,201. Of these 3074 were on simple hire, 265 on hire-purchase, 7743 on prepayment hire, and 119 on prepayment hire-purchase. In March, 1922, the total was 10,947. The number of new cookers fixed was 277, and 174 on hire-purchase. The number of gas-fires fixed totalled 197, of which 122 were sold, 5 sent-out on hire-purchase, and 70 on simple hire. During the year, 188 new service pipes were laid, and 245 new meters fixed; the total number of meters in use at the end of the year being 20,584—an increase on the previous year of 197. It is stated that in spite of unsettled markets the general working results of the gas estate have been exceedingly good; and the Department have realized more than was anticipated on residual products. The pressure has been slightly increased to meet the extra demands for gas, and the working pressure has been maintained above the requirements of the 1920 Gas Improvement Act.

Of the total 661,879,000 c.ft. of gas made, 550,247,000 was coal gas, and 111,632,000 c.ft. was carburetted water gas, compared with 507,344,000 c.ft. and 140,442,000 c.ft. respectively last year. The amount of gas made per ton of coal used was 11,943 c.ft. The average calorific value was 501 B.Th.U., compared with 502 B.Th.U. per c.ft. for 1921-22. The unaccounted for gas was 3·56 p.ct., compared with 3·24 p.ct. for the previous year. The total amount of gas made was the highest in the history of the undertaking. The general effect of reduction in wages was a lowering in the cost of manufacture from £153,776 to £97,359. The income from residuals was not so high as last year, but income from hire of cookers and fires showed an increase of £475.

A Technical Assistant.—At the Skipton District Council recently, it was proposed by the Gas Committee to appoint a technical assistant at the gas-works; but, after discussion, the matter was referred back for further consideration. An expert, engaged some time ago to report to the Council as to how the works should be run efficiently, had suggested the employment of a technical assistant, in particular to carry out the regulation tests fully. The opposition submitted that there was already sufficient technical knowledge at the gas-works.

PLYMOUTH AND STONEHOUSE GAS COMPANY.

Annual Meeting.

The Annual Meeting of the Plymouth and Stonehouse Gas Light and Coke Company was held at the Gas-Works, Coxside, on Tuesday of last week—Mr. J. H. ELLIS (the Chairman) presiding.

A SATISFACTORY YEAR.

The CHAIRMAN, in moving the adoption of the report, commented on the healthy financial position, and said this was the most satisfactory year he had had to report on during the whole time he had held office. The Company was one of the soundest financially among the many very sound undertakings in the great industry of this country. It was not only the best report and balance-sheet that he had submitted to them, but, having regard to the circumstances of the time, he believed it to be the best in the Company's long and honourable history. How widely different the position was now from what it was a very few years ago! Then they had lost at least one-third of their capital; and they were in a difficulty to raise money to carry on, owing wholly to matters entirely beyond their control. The Government wisely introduced legislation of a public character which put the gas industry in its right position. As to the capital account, they had purchased the old soil depôt, Cattedown, for £1525, and the new plant at the tar-works had cost £3392. With regard to Plympton, the sale of cottages had realized £678; and the amount written-off stoves and prepayment installations was £8803. This gave them a net credit for the year of £3886, increasing the balance at credit of the capital account to £41,102. The total expenditure on capital account now amounted to £452,839, which was equivalent to £318 per million c.ft. of gas sold. This was the lowest capital account they had ever had, and was due to the increase in business and to the diminution of the capital account. With regard to the revenue account, there had been a decrease in the cost of raw materials. In 1921-22, coal cost them £119,501; during the past year, it cost £89,006—a decrease, in round figures, of £30,000. The cost of coal in the pre-war days was only £62,905. Last year oil cost £30,895, compared with £23,384 this year—a decrease of a little over £7500. This was largely due to the market falling, and also to the fact that they had bought at the right time. Works repairs this year cost £63,143. Last year the cost was £52,854; but before the war they were £7958 only. Their expenditure on mains had been £12,468—a decrease of £3300. There was a satisfactory decrease in the general establishment charges from £2514 to £1430. The total credits amounted to £290,328—a decrease of £39,269. Sales of gas had realized £225,768, which was £50,975 less. Thus they had given to the consumers not merely the equivalent of the fall in the price of oil and coal, but nearly £12,000 more. They heard a good deal about increase in the price of gas because of the adoption of the therm system of charging. It was untrue to say that gas accounts had increased. Here and there they might have done so owing to a change of family circumstances, or, perhaps, carelessness, but, generally speaking, the accounts had decreased. He thought it was a good thing to bring not only cheap gas, but also cheap solid fuel, to the houses of the people of Plymouth, as they were doing. They had sold 5½ p.ct. more gas, and they had this amount of money less for it. The rentals of meters and stoves showed an increase of £1727; the sales of coke a decrease of £748; the sale of tar an increase of £10,093; while the sale of sulphate of ammonia showed an increase of £1078. The credit balance carried to the profit and loss account was £41,525—an increase of £6195. After providing for dividends and debenture interest, and carrying £924 to the redemption account, there remained a credit balance to be carried forward (subject to the payment of the half-year's dividend on July 1) of £48,439, compared with £36,131 the previous year. The amount required to pay dividend and debenture interest, &c., for the twelve months was about £37,500; so the remarkable strength and stability of their concern to-day would be seen. During the year they had invested £15,000 in War Loan. As to the outlook, they did not want to increase the price of gas; when coal was falling in price, they did want to reduce it. The coal market was in a very rocky condition; but he thought he could promise that during this financial year the price of gas would not be increased. He referred with satisfaction to the condition of the works, and thanked all the officers for the splendid manner in which they had worked during the year.

Mr. R. B. JOHNS seconded the adoption of the report and accounts, which was agreed to.

A SHAREHOLDER asked if the taking over of the Plympton Company had been a success?

The CHAIRMAN replied that it had been a complete success so far as the Plympton consumers were concerned; it had been a very fine profit-earning proposition.

The recommendation of the Directors that a dividend of £7 17s. 6d. p.ct. on the ordinary shares, 13s. 3d. on the additional shares, and 12s. 9d. per share on the New Shares Act of 1879, less income-tax, in addition to the authorized dividend paid in January last, be declared for the half-year ended March 31 last, was approved.

The retiring Directors, Mr. J. H. Ellis, Dr. J. A. F. May, and Mr. O. Wilcocks, were unanimously re-elected; and the Auditor, Mr. Ben Butland, was also re-elected.

Subsidence of the Centre of Bathgate.—An alarming subsidence occurred on June 17 in the business centre of this town. The gas-mains were broken; and workmen had to plug them. The subsidence extends for about 5000 sq. yards; and in this area the entire property has suffered.

Dublin Gas Inquiry.—Subject to an estimate as to cost, the Pembroke (co. Dublin) Urban District Council have decided to be represented at the proposed Government inquiry into quality and price of gas in the district supplied by the Alliance and Dublin Consumers' Gas Company—the area in question including the outlying townships. The Rathmines and Blackrock Councils have also taken action in the matter.

BOLTON CORPORATION GAS ACCOUNTS.

Reporting to the Town Council upon the results for the year ended March 31, the Bolton Gas Committee state that the quantity of gas made was 1,122,210,000 c.ft., compared with 1,123,214,000 c.ft. in the previous year. The Committee state that the manufacturing results obtained at the two works fully justify the policy of Mr. W. J. Smith, B.Sc., the Engineer and Manager. The new vertical-retort plant has been at work continuously throughout the year.

The accounts prepared by Mr. Percy Farnworth (the Borough Treasurer) show a gross profit of £109,775 for the past year, a record for the undertaking. The sum of £15,000 has been placed to the depreciation and renewals fund; and the capital account has been relieved to the extent of £18,271. The deficit of £27,619, carried forward from the previous year, has been wiped out; and a balance of £5810 is left to be carried forward to next year. The price of gas has been reduced by 1s.; the present price being 3s. 8d. per 1000 c.ft.

LANCASTER CORPORATION GAS-WORKS.

Reporting to the Lancaster Corporation Gas Committee on the working of the department for the year ended March 31, Mr. George Dixon, B.Eng., A.M.Inst.C.E., the Engineer and Manager, states that the total receipts were £77,803, and the expenditure £57,236, leaving a gross profit for the year of £20,567, and a net profit of £10,781. A sum of £5000 has been taken for the relief of the rates, and the balance of £5781 placed to the credit of the reserve fund, which now stands at £22,930.

The cost of coal was £25,440, averaging 23s. 9·08d. per ton, against 34s. 5·4d. in the previous year. Residuals realized £21,007, or equal to 82·7 p.ct. of the total cost of the coal, as compared with 70·2 p.ct. a year ago. The average price received for the gas sold was 3s. 0·09d. per 1000 c.ft. The unaccounted-for gas amounted to 4·4 p.ct. No rent is charged for meters. The price of gas for power and industrial purposes varies from 2s. per 1000 c.ft. net for a consumption of under 50,000 c.ft. a year to 1s. 3d. for quantities of 15,000,000 c.ft. and upwards.

PLYMOUTH AND STONEHOUSE GAS COMPANY.

In view of the recent visit of the Southern Association of Gas Engineers and Managers to the Plymouth and Stonehouse Gas Company's works, it is interesting to note that the Company were incorporated by special Act of Parliament in 1845, prior to which time, and for a short period subsequently, gas was manufactured at Millbay and supplied at the rate of 9s. per 1000 c.ft. by the United Gas Company, who also supplied Dublin, Cork, and Limerick.

The Plymouth Gas Company apparently owes its existence to the shortcomings of the United Company, for the first paragraph in the preamble of the 1845 Act states:

> The town and borough of Plymouth and the parish of East Stonehouse are at present inadequately supplied with gas light; and it would be attended with much advantage to the inhabitants thereof if a cheaper and better supply of gas light were afforded them.

The Company started making gas at Coxside in January, 1846, and charged the price of 6s. per 1000 c.ft. In September, 1848, the works of the United Company at Millbay were purchased and closed down; and the whole of the gas was manufactured at Coxside. In 1904, the Company extended their supply to Crown Hill, and in 1910 to the Plymstock district, while the works of the Plympton Gas Company were acquired in 1921.

In 1885 the coal used was only 7500 tons a year, and the gas sold 80 million c.ft. In the year ended March 31 last, the gas sold amounted to 1425 million c.ft.; the capital expenditure to that date being £456,000, at the rate of £320 per million—one of the lowest in the country.

The Plymouth Gas-Works now cover an area of 13 acres. Part of this land was formerly the site of the old Plymouth potteries; and interesting fragments of what, years ago, was a considerable industry are often met with when excavations are in progress. With a plentiful supply of the finest china clay in the world near at hand, and modern economical furnaces, fired with cheap gas, it will be a pity if this once flourishing industry cannot be revived.

Plymouth, being so far from the coal fields, the cost of obtaining the 60,700 tons of coal used annually by rail is prohibitive, and the Company's supplies are entirely water-borne; the coal being nearly all obtained from the Tyne. It is discharged from steamers at Bayley's Wharf, in the old Sutton Pool, by the Company's own cranes, and conveyed by steam-wagons to the works.

Evading Gas Bills.—At the Liverpool Police Court on June 15 it was stated that, in order to obtain an unregistered supply of gas, a man named Griffin had disconnected the meter inlet pipe from the main tap and had connected a rubber tube to the syphon pipe. He was fined £10.

Gas Profits and the Rates.—The Richmond (Yorks.) Town Council recently decided upon certain reductions in gas charges. The Mayor remarked that, in taking this step, the Corporation were making a bold move, because the Gas Committee were expected to contribute something like £500 to the relief of the rates. They had expended a great deal on capital account during the past year; but he thought the bulk of the extraordinary expenditure was now past. Brig.-Gen. Ingham-Brooke said he did not believe in the gas undertaking contributing in any way towards the relief of rates. He considered that gas should be provided cheaply for the consumer, and not put money in other ratepayers' pockets.

THE NORTH-EAST COAST COAL TRADE.

From Our Own Correspondent.

During the week the ascertainments for wages to be paid in July and August have been published. Based on March and April working results, they show a very considerable advance for the men. In the case of Northumberland, the pit-head cost of coal will be advanced by at least 1s. 6d. a ton, and Durham will be faced with somewhere about 1s. more than in May and June. The firmer tone of the last week or two was maintained in the market, and good all-round inquiry for the second half of the year gave every encouragement to collieries to hold their coal rather than meet would-be buyers. A few of the smaller collieries, it is true, are still weak for prompt and for next month, and a few merchants who have coal bought for this month still have some to place, which they will sometimes do at a discount on current colliery quotations. But those who have been trying to buy from the better-class collieries have found their terms full for this month, and mostly strongly sold for July.

Under pressure of considerable Continental inquiry for forward deliveries—chiefly from Belgium and France—coking has again been a strong market; and this has, of course, tended to keep the gas position distinctly firm. A good deal of coking coal has been sold; and two distinct transactions of 32s. 6d. f.o.b.—one for July-December and one for July-March—have been recorded, and point clearly to the present strength of Durham coals.

Two more prompt cargoes of gas for Australia are said to have been fixed during the week—one of them for a poor second-class at 28s. f.o.b.; but there does not seem to be much doing in that quarter except for absolutely prompt odd lots. America and South Africa are not likely to give this market much chance. There does not appear to have been much definite business passing in gas coal; but inquiry has been good for the second half of the year, and quotations of anything less than 30s. f.o.b. are probably unobtainable for Wear Specials and best qualities, with a shilling or two less for seconds.

The market is more or less in holiday mood; the present week being "race week," during which "half days" on 'Change number at least three, and the "Pitmen's Derby" is not conducive to record coal outputs.

COAL TRADE IN THE MIDLANDS.

From Our Local Correspondent.

There are still a number of new annual contracts for gas coal under negotiation at the time of writing; but in the majority of cases terms have been reached. Important Midland undertakings, like those at Birmingham, Leicester and Derby, have arranged their main supplies. Since the middle of the present month there have been signs of a feeling of insecurity among some of the Yorkshire collieries. Anxiety to make sure of good outlets for the production resulted in an easing of the quotations to the extent of about sixpence; but there was no further retrogression. Gas engineers who had refused to close at the rates previously offered found their procrastination justified. Derbyshire coalowners, many of whom were better sold, have not yielded perceptibly. The current consumptive demand for fuel indicates some decline in general industrial requirements; but gas coal is being taken in tonnages that show no diminution. As regards furnace coke, the position is difficult to reckon up. The tone of the market is weaker. There is no such superfluity of supplies, however, as the falling off in exports might infer.

Notwithstanding the shrinkage of business in iron and steel, the increased output of the blast furnaces appears to be maintained if the coke supply can be taken as a gauge. Values have given way only slightly.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From a Local Correspondent.

Gas coal contracts in Yorkshire and Lancashire are being made in certain directions for twelve months at advances from 1s. to 1s. 6d. per ton over last year's figures, though in some cases consumers are refraining from paying the prices.

The local household trade is on the quiet side, owing to the prospect of warmer weather—the recent unseasonable conditions not having quite the adverse effect of a similar state of affairs in previous years. While collieries report lack of stocks, there is an indication that they can execute orders for household fuel of all descriptions at short notice.

While there is no apparent improvement among the consuming industrial concerns, producers are asking advances of from 1s. to 2s. per ton to meet the increase in wages which will come into operation on July 1. Whether this will be maintained or not is purely a question of local conditions.

The recent lull in shipping inquiries in the export section still continues; there being few inquiries from the nearer Continental countries, including Germany. Whether this is a result of the higher rates of exchange or not is a matter for conjecture. If the present position continues during the next few weeks, there is a likelihood of collieries "playing" one or two days a week; but reliable authorities state that they anticipate the foreign demand will be renewed very shortly.

Reduction at Nantwich.—The Gas and Lighting Committee of the Nantwich Urban Council have decided that, from and after the June readings of the meters, the price of gas to ordinary consumers be reduced from 6s. to 5s. 8d. per 1000 c.ft. for lighting, and from 4s. 6d. to 4s. 3d. for power; such prices being subject to the existing rebate of 3d. per 1000 c.ft. to large consumers.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

London, *June* 25.

There is not much change to record in the tar products market. Little business is being reported in pitch, although the position is quietly firm; the price being nominal at about 150s. per ton. Creosote is steady at about 10d. to 10½d. per gallon, *ex* makers' works. Pure benzole is about 1s. 9d. per gallon; pure toluole from 2s. to 2s. 3d. per gallon; and 95/160 solvent naphtha about 2s. per gallon.

Tar Products in the Provinces.

June 25.

The average values for gas-works products during last week were: Gas-works coal tar, 71s. 6d. to 76s. 6d. Pitch, East Coast, 120s. to 125s. f.o.b. West Coast—Manchester, 117s. 6d. to 122s. 6d.; Liverpool, 118s. 6d. to 123s. 6d.; Clyde, 121s. to 126s. Benzole 90 p.ct., North, 1s. 5½d. to 1s. 6½d.; crude 65 p.ct. at 120° C., 11½d. to 1s. naked at makers' works; 50-90 p.ct., naked, North, 1s. 7d. to 1s. 7½d. Toluole, naked, North, 1s. 7d. to 1s. 8d. nominal. Coal tar crude naphtha in bulk, North, 8d. to 8½d. Solvent naphtha, naked, North, 1s. 3½d. to 1s. 5d. Heavy naphtha, North, 1s. 5½d. to 1s. 7½d. Creosote, in bulk, North, liquid, 7⅞d. to 8½d.; salty, 7½d. to 7⅞d; Scotland, 6⅝d. to 7⅞d. Heavy oils, in bulk, North, 8½d. to 9d. Carbolic acid, 60 p.ct., 3s. 4d. to 3s. 5d. prompt. Naphthalene, £15 to £16; salts, £6 to £8, bags included. Anthracene, "A" quality, 4d. per minimum 40 p.ct., purely nominal; "B" unsaleable.

TRADE NOTES.

Newbridge Controllers.

The Rotherham Corporation, having effected considerable saving on the installation of Newbridge controllers last season, have placed with the Horstmann Gear Company, Ltd., Newbridge Works, Bath, a further order for 500 controllers.

Messrs. Meldrums, Limited.

We learn from Messrs. Meldrums, Limited, that the past twelve weeks has been a period of great activity for this well-known firm. Among numerous orders for their forced-draught furnaces, five are to be installed in gas-works, and three in tar distilleries. Four gas scrubbers have been ordered for benzole and ammonia recovery. Other work includes a complete bye-product recovery plant, comprising distillation and rectification apparatus for shale oil, and a complete condensing and recovery plant for a gas and oil company.

"Ruston and Hornsby" Suction Gas Pumping Plant.

The above plant (made by Messrs. Ruston and Hornsby, Ltd., Lincoln) is among the entries for the Silver Medal Royal Agricultural Society's show at Newcastle. These compact and inexpensive pumping plants are intended for domestic, general, and farm purposes, where it is required to raise from 1000 to 3000 gallons of water per hour. Each plant consists of a single ram pump, driven by a gas-engine by means of machine-cut spur gearing; the pump being bolted to the front of the engine bedplate. Gas is supplied by a small self-contained producer suitable for charcoal fuel. Normally the engine is hopper cooled; but, if desired, tank circulation can be arranged. High-tension magneto ignition and variable admission covering are fitted. The engine can be put on full load, and pumping started, within ten minutes of lighting the fire, and thereafter slight attention is required once per hour. The consumption of charcoal in the case of the 1000-gallon plant is about 3½ lbs. per hour. When not required for pumping, the engine can be used for driving other machinery, and a pulley is supplied for this purpose. The same kind of pumping plant is also supplied without a gas producer, but suitable for using petrol or paraffin.

Faulty Gas-Meters at Skegness.

Some weeks ago the Council sent out a number of notices demanding payment of varying amounts alleged to be due on account of faulty prepayment meters, representing the balance between the sum inserted and the amount due as shown by the consumption figures. The matter was taken up by the Ratepayers' and Property Owners' Association of the town, and a reply has just been received to the following effect: "The Council used every effort by application to the consumers in default for the gas consumed which was not registered by their meters. They would, no doubt, have had recourse to legal proceedings, but there are decisions of the Courts to the effect that such sums are not recoverable. In confirmation of this I am instructed to enclose a copy of a report of the Secretary of State on a Gas Bill which is being promoted by one of the Metropolitan Gas Companies, in which a clause was inserted providing for payment in such circumstances. The Secretary of State refused to support the clause as being likely to work hardship on slot meter consumers. With regard to the future, the Council are taking steps which they consider will have the effect of preventing loss of revenue." The principal point in the report referred to reads as follows: "The Company has, the Secretary of State thinks, no right to be protected at the cost of the consumer against loss from accidental defects in its own instruments; and, if the object of the proposal is to protect the Company against loss from wilful tampering with the meter, this should be done, if at all, by express provisions aimed at offenders, and not by imposing an obligation on all consumers."

Blandford Gas Company.—Intimation has been made of the Blandford (Dorset) Gas Company's intention to reduce their price by 5d. per 1000 c.ft. to the ordinary and slot consumers, as from June 30. The present price by ordinary meter is 6s. 3d. per 1000 c.ft.

Value of Paint as an Illuminant.

It has been very rightly pointed out by a contributor in the "Gas Engineer" that it is a great mistake for a gas undertaking to confine repainting to outside plant, with the sole object of preventing corrosion. This is, of course, the most urgent of the repainting jobs; but, at the same time, gas-works offices, laboratories, and shops should be given due attention. Until quite recently, he says, aside from those engineers to whom photometer tests were a matter of daily routine, there was little conception of the effect on the general lighting of a shop or an office of the colour of the walls and ceiling. Cream is a very satisfactory colour, because it is slightly warmer in appearance than a dead white, which may reflect lighting units to even an uncomfortable degree. At the same time, cream is light enough to encourage cleanliness and aid in the natural, as well as artificial, lighting of the room. Besides the actual increase in lighting intensity caused by lighter walls and ceilings, there is also the question of diffusion. With cream walls and a light ceiling, diffusion over a large room from a single lighting unit will be excellent; and if a semi-indirect fitting is employed, the diffusion produced by the surroundings will aid in eliminating shadows. Precisely the same remarks apply to natural lighting; where, if the walls and ceilings are light, a few minutes of artificial lighting in each day will be saved. Light surroundings not only increase illumination, but are decidedly more cheerful than are dark walls. A dirty wall may reflect only 20 p.ct., or even less, of the light thrown on it, and the general effect will be one of depression; while a clean, light wall will reflect anything from 50 to 70 p.ct. of the light striking its surface. What could be better, either from the point of view of keeping down illuminating costs or keeping up spirits?

Cheaper Gas for Hinckley.—The Hinckley District Council Gas-Works have made a net profit for the year of £4160. It has been decided to reduce the price of gas 3d. per 1000 c.ft., making it 3s. 8d. for lighting and cooking, and 3s. 1d. for power and heating.

Kidderminster Gas Company.—The Kidderminster Gas Company have given notice that the price of gas will be reduced after the June meter readings to 1s. 0½d. per therm, which, with discounts, will make the net price equivalent to 1s. per therm, or 4s. 6d. per 1000 c.ft.

Tottenham District Light Stock.—The Directors of the Tottenham District Light, Heat, and Power Company announce that the issue of £100,000 "B" consolidated stock of the Company was considerably over-subscribed. The average price of the tenders accepted was £104 1s.

Llandudno Gas Prices.—The recent results in the working of the gas undertaking at Llandudno have enabled the Gas Committee to make a recommendation to the Council that the price of gas be reduced by 3d. per 1000 c.ft. If adopted, the price will be 5s. 9d., as against 6s. 6d. a few months ago.

Eckington Gas Company.—At a meeting of the Eckington (Derbyshire) Parish Council, it was reported that a deputation had interviewed the Eckington Gas Company, with the view of obtaining a reduction in the price of gas for street lighting. It was stated that a reduction would be made commencing in July.

Explosion at the Alexandria Gas-Works.—An explosion occurred on June 21 at the Vale of Leven Gas Company's works; a portion of the roof of one of the workshops being blown off. The cause of the explosion is unknown. Fortunately, in spite of the violence of the explosion, none of the workmen was seriously injured.

Belfast Gas Profit.—While, as already reported, the gross profit of the Belfast Municipal Gas Department on the manufacture and sale of gas last year was £124,671, being an increase of £59,869 on the previous year, the net profit is shown at £80,719, which, deducting £16,006 credit balance from the previous year, leaves a total to credit of profit and loss account of £64,713.

Cheaper Gas at Smethwick.—The accounts of the Smethwick gas undertaking show a credit balance of £1829, as compared with a deficiency for the previous year of £2265. It has been decided that, in addition to the reduction in the price of gas authorized in March, a further all-round reduction of 3d. per 1000 c.ft. be made as from July 1. For prepayment consumers the discount will be increased from 20 p.ct. to 25 p.ct. as from July 16.

Gift to Leeds Infirmary.—The children of Mr. and Mrs. L. Clayton, who celebrated their diamond wedding on June 22, are marking their appreciation of the event by endowing two cots at the Leeds General Infirmary. Mr. L. Clayton is the founder and Chairman of Messrs. Clayton, Son, & Co., Ltd., of Hunslet. He is also Chairman of other local engineering firms—Deighton's Patent Flue and Tube Company, Ltd., the Yorkshire Patent Steam Wagon Company, Messrs. Goodall, Clayton, and Co., and Messrs. Rice, and Co., Ltd.

Results at Oswaldtwistle.—Satisfaction at the year's working of the Ostwaldtwistle Gas Department was expressed by Councillor Usher (Chairman) on June 21. The output, it was stated, constituted a new record. Trunk mains had been increased, on which work £4950 had been spent. The price of gas had been reduced by 1s. 8d. in little more than twelve months. The total expenditure had been £18,748 and the income £24,133, leaving a gross profit of £5473. Debt had been repaid amounting to £1688. The net deficit on the undertaking was now £5125. A resolution that several outstanding maturing loans, amounting to £885, be repaid out of the gross profits for the year ended March 31 was referred back.

Evesham Gas Undertaking.—The report on the year's working of the Evesham gas undertaking shows the total expenditure for the year (exclusive of depreciation, interest on loans, and instalments of loans) as £25,580, as compared with £31,014 for the previous twelve months. The result of the year's trading shows a profit of £978, as compared with a loss of £3269 for the previous year. The revenue shows increases under the headings of private lighting, public lighting, and prepayment meters and fittings, but a decrease under the head of residuals. The amount realized for the sale of residuals works out at 65¾ p.ct. of the cost of the coal, as compared with 53¼ p.ct. for the previous year. The balance due to the Treasurer at the close of the year was £7356.

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STOCK MARKET REPORT.

DULL as the Stock Markets have been for some weeks recently, last week capped them all. The depression which characterized the opening day hardened increasingly until by Thursday pretty well every market was dead flat. A brave attempt was made on Friday to dissipate the gloom which brooded over everything; but it was unequal to the struggle, and dullness again reigned.

It is gratifying to be able to record that the Gas Market was immune from this trouble. Business was well up to the average of activity, and the general firmness was unimpaired, while several quotations actually advanced—viz., Alliance and Dublin 2, Bournemouth 5 p.ct. and 4 p.ct. debenture 1 each, Continental Union preference 2, Liverpool preference 1, Newcastle debenture 1, the three Sheffields 3 each, South Suburban 3, Tottenham debenture 3½, and Wandsworth Wimbledon 2.

The following transactions in gas during the week were recorded: On Monday, Alliance and Dublin 4 p.ct. debenture 73, 73½, Bournemouth 5 p.ct. 11⅝, ditto "B" 12½, ditto 6 p.ct. preference 16½, Brentford "B" 103, Commercial 4 p.ct. 98½, 98⅝, Continental Union 46½, ditto 7 p.ct. preference 73, 76, 76½, Gas Light ordinary 99⅜, 99⅞, 100, 100⅛, 100¼, 100⅜, 100¼, ditto 3½ p.ct. maximum 67½, ditto 4 p.ct. preference 82¼, Imperial Continental 165½, 166, 167, ditto 3½ p.ct. debenture 76⅜, 77¼, Primitiva 7s. 6d., ditto 5 p.ct. preference 37s. 4½d., South Metropolitan 99½, 99⅝, 99⅜, South Suburban 105, ditto 5 p.ct. debenture 100, Swansea 6½ p.ct. debenture 107½, Tottenham "B" 104½, 105½, ditto 4 p.ct. debenture 78⅜, Wandsworth ordinary new issue 102½, 103, British "B" 12, Harrow and Stanmore ordinary 104, Sutton 98, Danish 4 p.ct. debenture 80⅞, 81. On Tuesday, Brentford "A" 105, ditto "B" 105, Commercial 4 p.ct. 99, Continental Union 45½, 46, Gas Light ordinary 99¾, 99⅝, 100⅜, ditto 3½ p.ct. maximum 67⅛, ditto 4 p.ct. preference 82, ditto 10 p.ct. bonds 193, 194, Imperial Continental 165, 166, 166½, Oriental 100, 100½, Primitiva 5 p.ct. preference 36s. 3d., South Metropolitan 99, 99⅜, ditto 6½ p.ct. debenture 106½, Tottenham 4 p.ct. debenture 80, Wandsworth Wimbledon 115, Harrow and Stanmore ordinary 103. On Wednesday, Bombay 5½, 5⅝, Cape Town 4½ p.ct. debenture 77, Commercial 4 p.ct. 98, ditto 3 p.ct. debenture 58¾, Continental Union 46½, European 9, Gas Light ordinary 99⅞, 100¼, 100⅜, ditto 3½ p.ct. maximum 68, ditto 3 p.ct. debenture 63, Imperial Continental 164½, South Metropolitan 99¾. On Thursday, Bournemouth 4 p.ct. debenture 81, Brentford "A" 104, Commercial 4 p.ct. 97, ditto 3 p.ct. debenture 59½, European 8⅛, Gas Light ordinary 99, 99⅛, 99⅜, 100, 100⅛, 100¼, 100⅜, ditto 3½ p.ct. maximum 68¼, Newcastle 88½, ditto 3½ p.ct. debenture 72, Primitiva 7s. 6d., ditto 5 p.ct. preference 36s. 6d., South Metropolitan 99, South Suburban 104, 104¼, Swansea 7 p.ct. preference 103, ditto 6½ p.ct. debenture 106½, 107, Tottenham "B" 105, British (Hull) 3½ p.ct. debenture 68, Grays and Tilbury 7 p.ct. "B" 7½, 7 9/16, Reading 5 p.ct. maximum 81½, 82. On Friday, Aldershot 4 p.ct. preference 72, Cape Town 6 13/16, 6⅞, Commercial 4 p.ct. 97½, Gas Light ordinary 99½, 99⅝, 99⅞, 99¾, 100⅛, 100¼, ditto 3½ p.ct. maximum 68¼, Imperial Continental 163½, ditto 3½ p.ct. debenture 77, 77¼, Malta and Mediterranean 3⅜, Primitiva 7s., South Metropolitan 99, 99¼, 99½, South Suburban 103, 104, 105, ditto 5 p.ct. debenture 97, 99½, 99¾, Tottenham "A" 124, British (Hull) 3½ p.ct. debenture 69, 69⅜, 70, British (Norwich) 3 p.ct. debenture 59, 59¾, Danish 4 p.ct. debenture 80⅜, 81.

In the Money Market, the familiar variations were in full action, but were not violent in degree. Rates stiffened up to mid-week, when abundant supplies came to the rescue and the week closed in a condition of marked ease. Discount was fairly firm. Silver cheapened on sales. The Bank of England rate was 3 p.ct., as fixed on July 13.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S TRANSACTIONS.

£ Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Transactions.
			p.c.					
131,978	Stk.	Feb. 22	—	5%	Aldershot 5 p.c. max. C.	..	74—79	...
190,492	,,	,,	4	4%	Do. 4 p.c. Pref.	..	72—77	72
1,551,868	,,	Apl. 5	2½	5%	Alliance & Dublin Ord.	59—64	63—68	73—73½
374,000	,,	Jan. 11	4	4%	Do. 4 p.c. Deb.	76—79	5—5½	...
280,000	5	May 17	7½	4/-	Bombay, Ltd.	5⅞—6⅛	12—13	5½—5⅝
100,000	5	Feb. 22	16	8/-	Bournemouth Gas and Water { 5 p.c. / B 7 p.c. / Pref. 6 p.c. / 4 p.c. Deb.	..	12—13	11⅞
383,110	10	,,	7	7/-		15—15½	10½—11⅜	12½
115,000	10	,,	6	6/-		13¼—14	78—83	11⅛
162,065	—	Dec. 29	—	4%		..	102—107	81
2992,043	Stk.	Feb. 22	14	6/-	Brentford A Consolid.	261—266	102—107	104—105
734,920	,,	,,	11	6/3	Do. B New	204—209	85—90	105
55,000	,,	,,	5	5%	Do. 3 p.c. Pref.	109—111	77—82*	...
221,400	,,	June 14	4	4%	Do. 4 p.c. Deb.	91—93	175—180	...
214,775	,,	Mar. 8	11	11%	Brighton & Hove Orig.	208—213	130—135	...
244,200	,,	,,	8	8%	Do. A Ord. Stk.	154—159	95—96	...
1,272,500	Stk.	Feb. 22	5	5%	Bristol 5 p.c. max.	..	12½—13½	...
570,000	20	Mar. 22	12½	10/-	British A Ord.	44—45	12—13	...
10,000	10	Dec. 29	—	7/-	Do. 7 p.c. Pref.	..	75—80	...
120,000	Stk.	June 29	4	4%	Do. 4 p.c. Deb. Stk.	88—90	57—60	...
230,335	,,	Dec. 29	4	4%	Buenos Aires 4 p.c. Deb.	85—87	6½—7	6 13/16—6⅞
100,000	10	May 17	—	—	Cape Town & Dis., Ltd.	1⅛—2⅛	6—7	...
100,000	10	May 3	—	4/6	Do. 4½ p.c. Pref.	4—6	72—77	77
100,000	Stk.	Dec. 29	4½	—	Do. 4½ p.c. Deb. Stk.	70—75	109—114	...
237,860	,,	,,	—	7½%	Cardiff 7½ p.c. Deb.	..	..	...
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	97—100	97—99
1,513,280	,,	Mar. 8	5/9/4	60/-	Commercial 4 p.c. Stk.	106—108	97—100	...
360,000	,,	,,	5½	60/-	Do. 3½ p.c. do.	103—105	56—61*	58½—59½
475,000	,,	June 14	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	42—47	45½—46½
800,000	,,	Dec. 15	4	—	Continental Union, Ltd.	76—79	72—77	73—76½
200,000	,,	Dec. 14	7	4%	Do. 7 p.c. Pref.	115—118	103—106	...
660,000		Mar. 8	—	6%	Croydon sliding scale.	..	83—86	...
284,975		,,	—	5%	Do. max. div.	..	..	...
492,270	Stk.	,,	6	4½%	Derby Con. Stk.	123—125	..	...
55,000	,,	Apl. 5	4	4%	Do. Deb. Stk.	102—104	..	...
209,000	,,	Jan. 25	10	5%	East Hull 5 p.c. max.	..	..	...
1,002,180	10	Feb. 8	4/17/4	5/-	European, Ltd.	17⅛—18	8½—9⅛	8 13/16—9
16,546,120	Stk.	,,	3½	35/-	Gas Light and Coke { 4 p.c. Ord / 3½ p.c. max. / 4 p.c. Con. Pref. / 3 p.c. Con. Deb. / 10 p.c. Bonds / 7½ p.c. Ilford Deb.	98—102	99¼—101⅛	99—100¼
2,600,000	,,	,,	4	4%		76—79	67—69	67½—68½
4,062,235	,,	June 14	3	3%		96—99	81—83	82—82½
4,761,930	,,	Dec. 11	10	10%		72½—74½	61—64*	63
130,000	,,	—	—	—		..	..	193—194
82,500	,,	Mar. 8	5	65/7½	Hastings & St. L. 5 p.c.	..	..	...
258,740	,,	,,	3½	50/7½	Do. 3½ p.c.	87—89	92—97	...
70,000	10	May 17	11	10%	Hongkong & China, Ltd.	16½—16¾	75—78	...
86,600	Stk.	Mar. 8	9	9½%	Hornsey 7 p.c.	..	15—16	...
1,976,000	,,	May 31	9	£17	Imperial Continental	150—160	147—152	...
404,800	,,	Feb. 8	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	161—166	163½—167
235,242	,,	Mar. 8	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	75—78	76¾—77¼
2,498,905	,,	Feb. 26	10	37/6	Liverpool 5 p.c. Ord.	..	97—102	...
600,000	,,	Mar. 22	—	7%	,, 7 p.c. Pref.	..	..	...
165,736	,,	Feb. 22	7/5/6	80/-	Maidstone 5 p.c.	..	107—110	...
63,480	,,	Dec. 29	—	3%	Do. 3 p.c. Deb	..	107—112	...
75,000	5	June 14	6	3/6	Malta & Mediterranean	4⅛—4½	53—58	...
100,000	100	Apl. 5	4½	4½%	Met. of Melbourne { 4½ p.c. Deb.	..	3¾—4*	3¾
541,920	Stk.	May 17	4	4%		99—101	97—100	...
1,875,892	,,	Feb. 22	4½	5½%	Monte Video, Ltd.	11⅛—12	57—62	...
250,166	,,	,,	—	4%	Newcastle & Gatsh'd Con.	98½—99½	88—89	88½
529,705	,,	Dec. 29	3½	3½%	Do. 4 p.c. Pref. Stk.	..	76—78	...
15,000	10	Aug. 26	—	7/6	Do. 3½ p.c. Deb.	82—83	71—73	72
55,940	10	Mar. 8	7/14/0	7/88	North Middlesex 10 p.c.	..	..	...
300,000	Stk.	May 3	8	8%	,, 7 p.c.	14—15	12—13	...
188,120	Stk.	Dec. 29	—	72/6	Oriental, Ltd.	117—122	97—102	100—100½
60,000	50	Mar. 8	13	65/-	Plym'th & Stonh'se 5 p.c.	..	107—112	...
100,000	50	,,	12	60/-	Portsea Island, B	128—131	103—108	...
290,069	5	,,	8	—	Do. C	118—121	100—105	...
499,960	3	—	5	—	Primitiva Ord.	5½—6	½—⅝	7/-
321,600	100	June 1	4	4%	Do. 5 p.c. Pref.	4½—5	1½—2	36/3—37/4½
600,000	Stk.	Jan. 25	4	4%	Do. 4 p.c. Deb.	91—93	70—73	...
346,198	,,	Dec. 29	4	4%	Do. ,, 1911	..	57—60	...
150,000	10	Mar. 22	6	6/-	River Plate 4 p.c. Deb.	85—87	57—60	...
125,000	50	July 3	5	5%	San Paulo { 6 p.c. Pref. / 5 p.c. Deb.	10½—11	5½—6½	...
135,000	Stk.	Mar. 22	10	5%	Sheffield A	47—49	38—41	...
209,984	,,	,,	10	5%	Do. B	223—224	103—105	...
525,500	Stk.	,,	10	5%	Do. C	222—224	103—105	...
133,201	,,	Sept. 15	4	4%	Shrewsbury 5 p.c.	220—229	103—105	...
90,000	10	May 31	9	9/-	South African	..	..	...
6,609,895	Stk.	Feb. 22	5/4/0	60/-	South Met. Ord.	10½—11½	8—10	...
250,000	,,	Jan. 11	—	5%	Do. Red. Pref.	111—113	99—101	99—99½
1,895,445	,,	,,	3	3%	Do. 3 p.c. Deb.	..	98—100	...
734,000	,,	Mar. 8	—	6½%	Do. 6½ p.c. Deb.	72½—74½	63—65	...
91,500	,,	Feb. 22	8½	8½%	South Shields Con. Stk.	..	105—107	106½
1,087,795	,,	,,	6	6%	S'th Suburb'n Ord. 5 p.c.	157—159	129—131	...
368,837	,,	Dec. 29	5	5%	Do. 5 p.c. Deb. Stk.	114—116	103—106	103—105
647,740	,,	May 3	5	5%	S'th'mpt'n Ord. 5 p.c. max.	116—118	95—100	97—100
121,275	,,	Dec. 29	4	4%	Do. 4 p.c. Deb. Stk.	99—102	88—91	...
250,000	,,	Mar. 8	—	7½%	Swansea 7 p.c. Pref. Stk.	..	73—78	...
200,000	,,	Dec. 29	—	6½%	Do. 6½ p.c. Deb. Stk.	..	102½—104½	103
120,000	,,	Feb. 22	6	6%	Tottenham District { A 5 p.c. / B 3½ p.c. / 4 p.c. Deb.	135—138	106—108	106½—107½
782,275	,,	,,	4	4%		115—117	123—128	124
181,255	Stk.	June 14	5	5%		87—89	102—107	104½—105½
258,251		Mar. 22			Tynemouth 5 p.c. max.	108½—109	78—82*	78½—80
30,000	,,	Feb. 22	8½	87/6	Wandsworth, Wimbledon, and Epsom—		90—92	...
254,636	,,	,,	6½	72/6	Wandsworth A 5 p.c.	151—156	130—135	...
108,075	,,	,,	—	61/3	Do. B 3½ p.c.	129—134	115—120	...
140,865	,,	,,	6½	61/3	Do. C.	..	100—105	...
352,000	,,	,,	6½	68/9	New Ordinary	..	100—105	...
98,000	,,	,,	—	73/9	Wimbledon 5 p.c.	117—122	112—117	115
88,416	,,	Dec. 29	3	3%	Epsom 5 p.c.	121—126	115—120	...
					3 p.c Deb. Stk.	66—69	58—61	...

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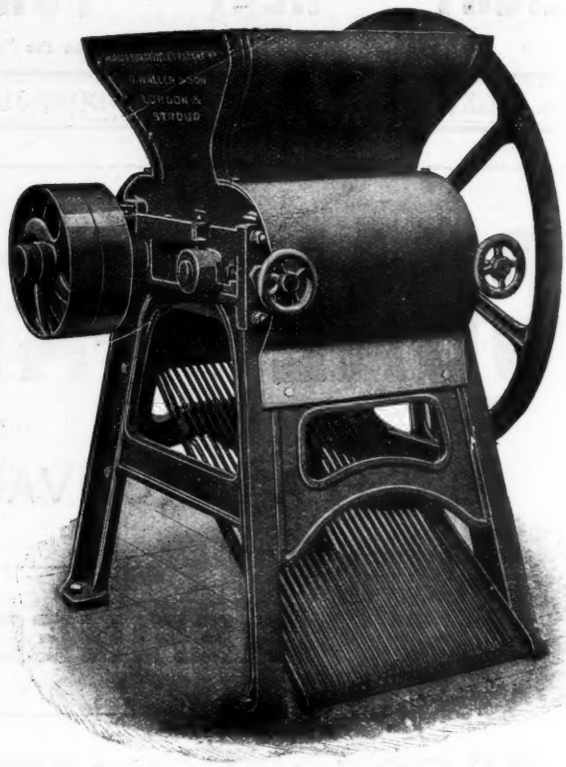

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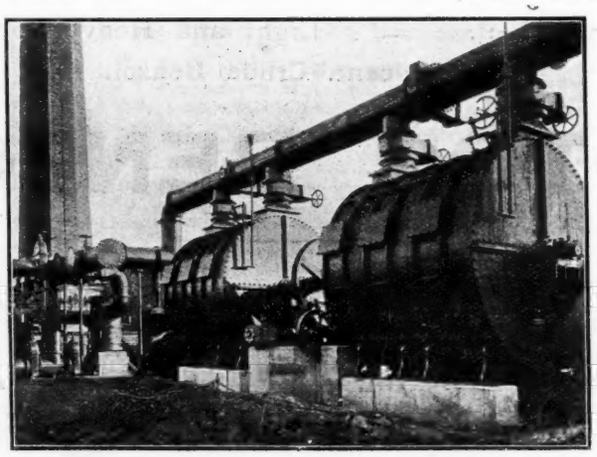

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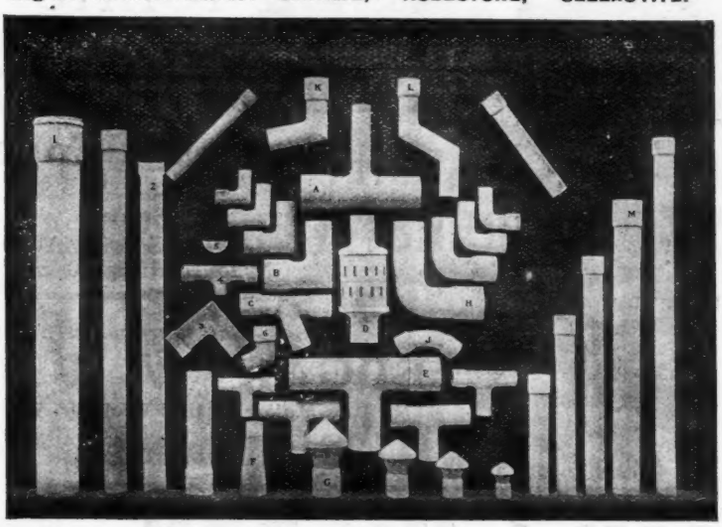

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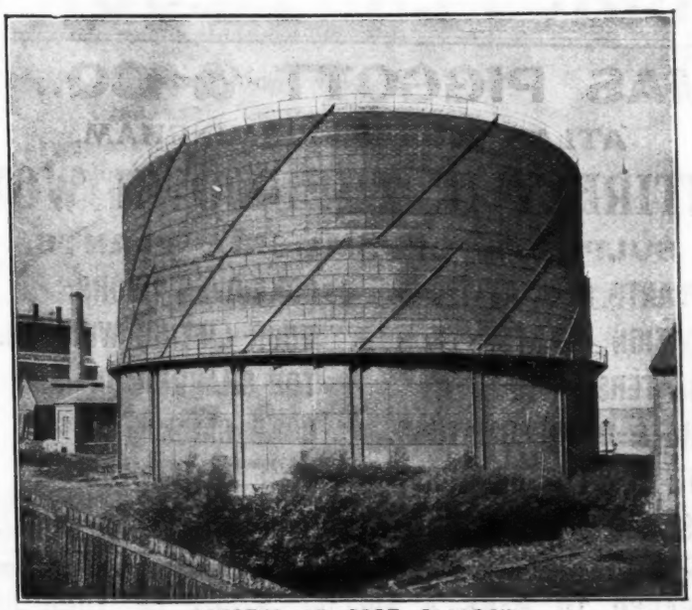

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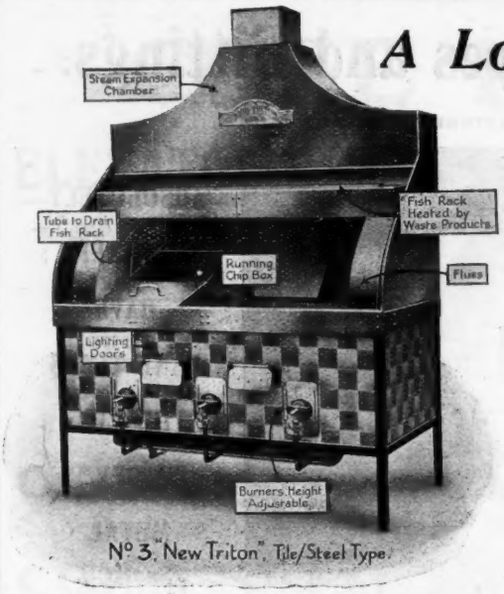

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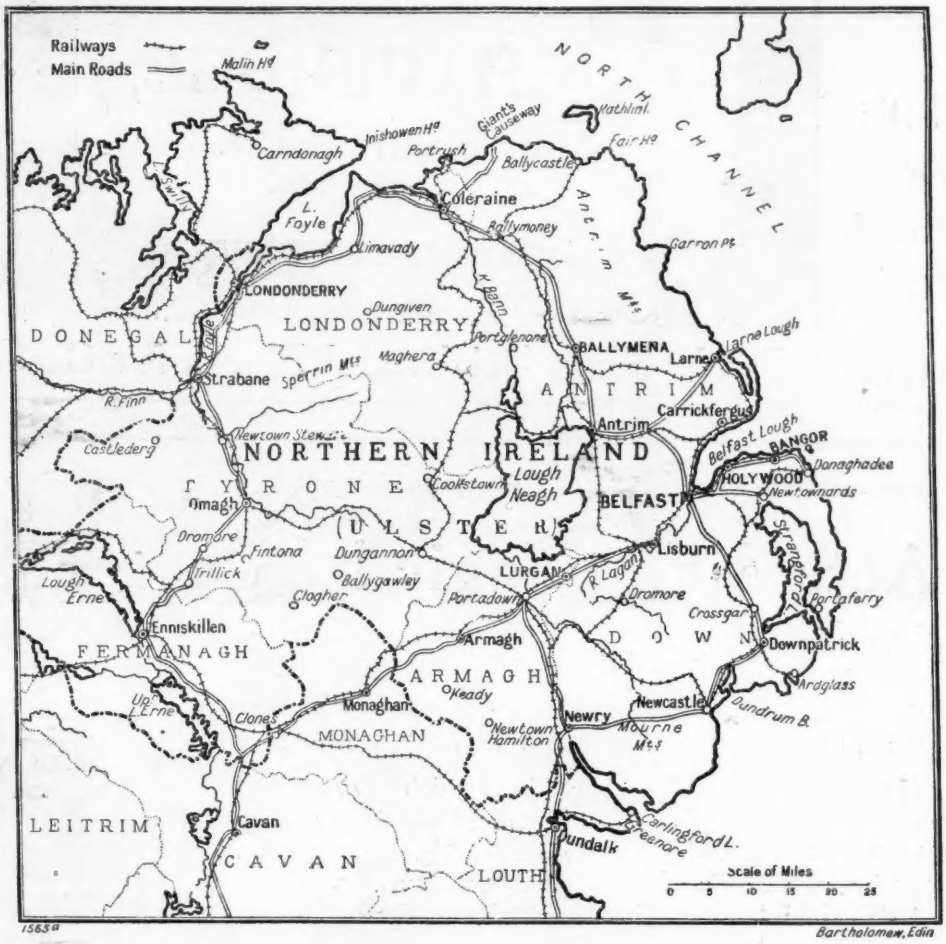

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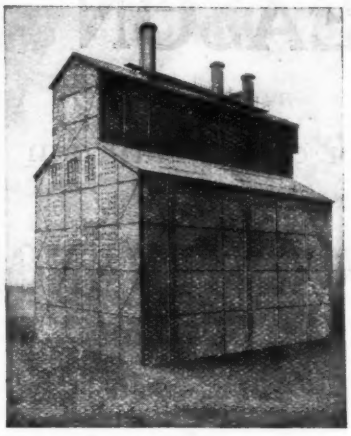

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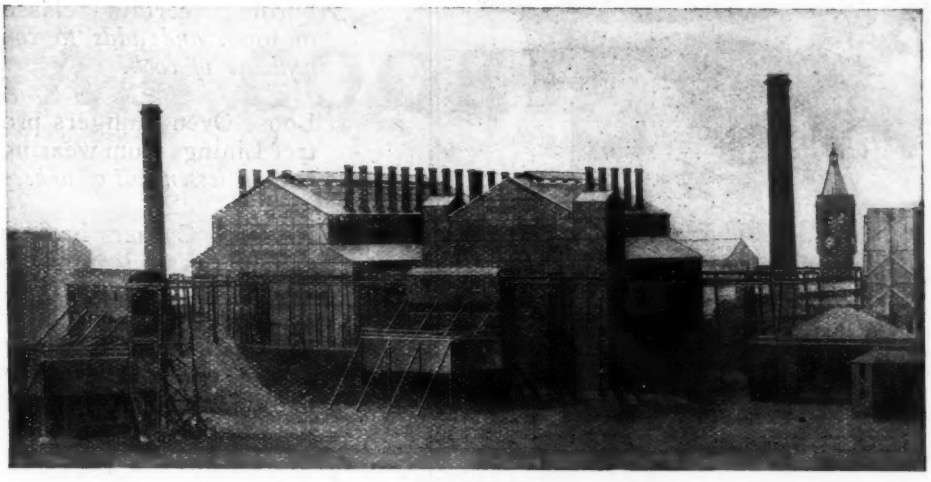

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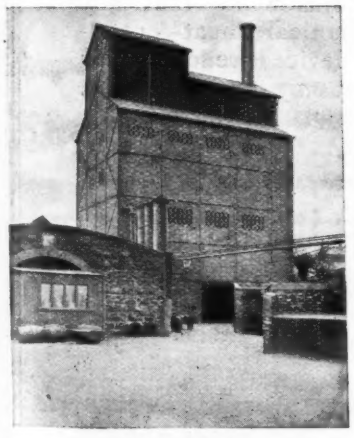

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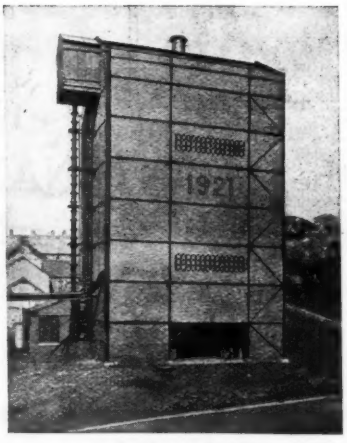

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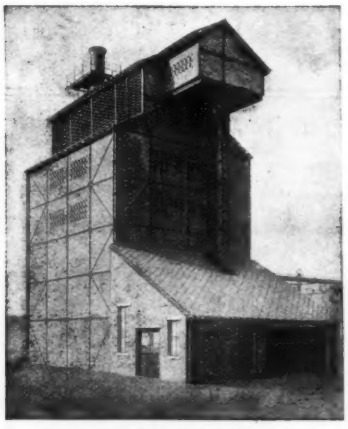

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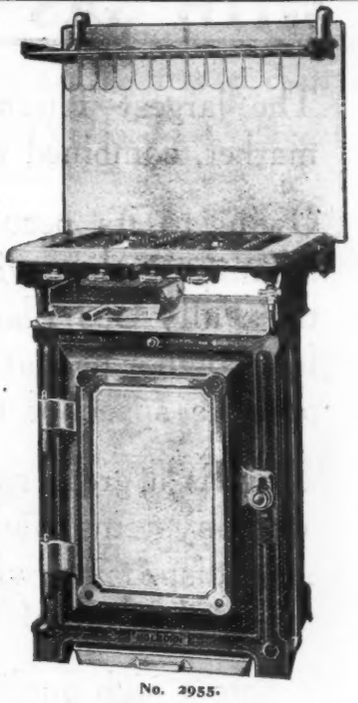
GLASSWARE—Clear, Opal, or Coloured—for all lighting purposes
STAMPINGS AND PRESSINGS in all Metals.
COINS, MEDALS, TOKENS, &c.
LAMPS (Oil, Spirit, and Acetylene) for Mines, Quarries, Railways, Engineers, &c.
SPECIAL FURNACE CEMENT for Repairing and Rebuilding Furnaces, Coke Ovens.

PARKINSON
GAS COOKERS
for
PLEASING APPEARANCE
QUALITY of MANUFACTURE
EFFICIENCY in RESULTS,
are still unrivalled.



No. 2955.

The Parkinson Stove Company, Ltd.

Offices and Works:
STECHFORD, BIRMINGHAM.
Telephone: STECHFORD 44.
Telegrams: "APPLIANCE, BIRMINGHAM."

Glasgow Works:
57, John Street,
BRIDGETON.

London Showrooms:
129, HIGH HOLBORN, W.C. 1.
Telephone: MUSEUM 2256.
Telegrams: "GAZOLITE, WESTCENT, LONDON."

JOHN BROWN & CO., LTD., Colliery Offices: ROUNDWOOD, Nr. ROTHERHAM.

OWNERS OF THE FAMOUS

Aldwarke, Rotherham, & Dalton Main Gas Coals

As used by the principal Gas Companies of the World.

ALSO PRODUCERS OF THE BEST SOUTH YORKSHIRE ASSOCIATED HARDS (BARNSLEY BED).

TELEGRAPHIC ADDRESS: "ROUNDWOOD, ROTHERHAM." TELEPHONE: ROTHERHAM 226.

TULLY GAS PLANTS

By kind permission of the Manager, Mr. Wilfred Tallentire, the Tully Gasification Plant recently erected at the Gas Works, LURGAN, will be open to inspection by any Engineers interested.

LURGAN WILL BE SUPPLIED SOLELY WITH GAS FROM THE TULLY PLANT.

The largest Therm output per ton of any gas plant on the market, combined with the lowest capital cost per Therm.

Owing to its peculiar advantages in economising space and labour together with simplicity and flexibility of operation, the Tully Gas Plant is eminently suitable for producing gas for Town's use at the lowest possible cost in the shortest possible space of time.

There is a great reduction in handling and labour costs over other systems owing to the absence of double handling of coke, dispensing with the use of screens and the loss due to the production of breeze.

Where a high quality gas is desired, efficient carburettors can be added and less oil is required than by any other process.

Nearly 200 Plants erected or on order.

Prompt delivery of Plants of standard size can generally be given.

Copies of recent Testimonials supplied on application.

ENQUIRIES INVITED.

TULLY GAS PLANTS LTD.,

47, Victoria Street, Westminster, London, S.W.

Telegrams: "DAMPER SOWEST LONDON."
Telephone: VICTORIA 8476.

Works: MILLGATE, Newark-on-Trent.

JB **PUMPS** JB

FOR ALL PURPOSES.

Water, Oil, Petrol, Tar, etc

EITHER **HAND OR POWER.**

The "Norfolk" Hand Pump.

The "Squeegee" Positive Power Pump (Patented).

Also HOSE, UNIONS, and FITTINGS.

THE "EAGLE" EXHAUST HEAD

Fit the "EAGLE" Exhaust Heads to all your exhausts and thus maintain cleanly surroundings. Walls and roofs are not damaged by excessive moisture.

The noise of exhaust is considerably reduced. There is no back pressure on the engine. Only dry steam escapes.

Also Steam and Water Fittings.

Power Transmission Material, &c.

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THE **"PARKINSON"**

TYPE "G" SERIES

No. 840
Cast Brass PRE-HEATED INVERTED BURNER.

Model "B."
Single Outside GAS and AIR Regulator.

Write for List 80.

PARKINSON and W. & B. COWAN, LTD.
Lighting Specialists,
LONDON. BIRMINGHAM. BELFAST.
EDINBURGH. MANCHESTER. SYDNEY, N.S.W., &c., &c.

BLAIR'S SCRUBBER

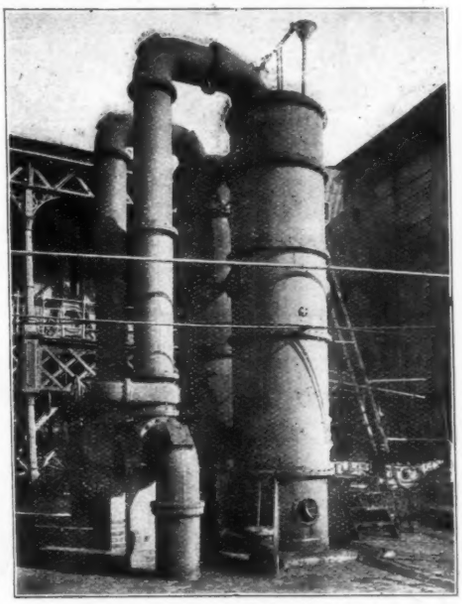
(Maclaurin's Patent)

The MOST EFFICIENT SCRUBBER for the removal of NAPHTHALENE

Complete removal
together with
Low Capital Cost

Small ground space occupied
and
Low working and maintenance charges

make the Blair Centrifugal Scrubber the best proposition before the Gas Industry for overcoming one of the most serious and worrying problems that Gas Engineers have to contend with.



BLAIR'S CENTRIFUGAL SCRUBBERS AT A MIDLAND GASWORKS.

BLAIR, CAMPBELL & McLEAN, Ltd.

'Phones: Govan 262 (3 lines). Holborn 1075.

GOVAN, Glasgow.

'Grams: "Blazon, Glasgow." "Multivap, Holb., London."

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Sardinia House, Kingsway, W.C.2
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No. 2.

THE GAS METER COMPANY, LTD.

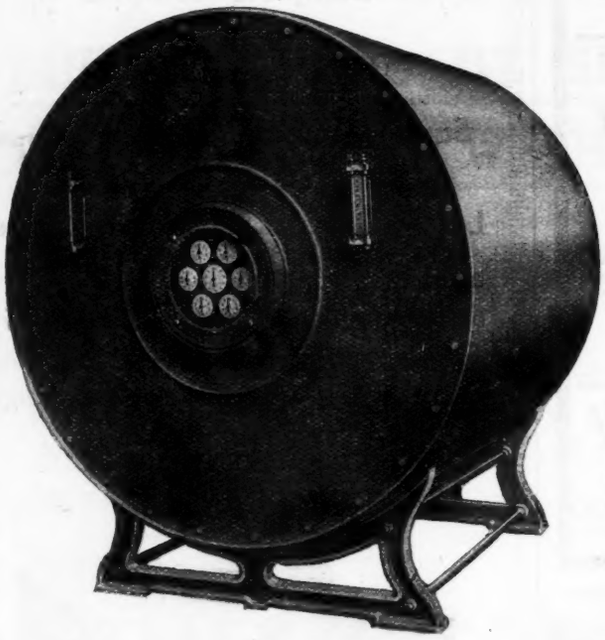
'Phone: DALSTON 142

238 KINGSLAND RD., LONDON, E. 2

Telegrams: "METERPHONE, LONDON"

CYLINDRICAL STATION METERS

IN CAST IRON CASES STANDARD PATTERN



FRONT VIEW.

Fitted with Water Line and Pressure Gauges, Overflow, Thermometer, Index, with or without Clock and Tell-tale as required.

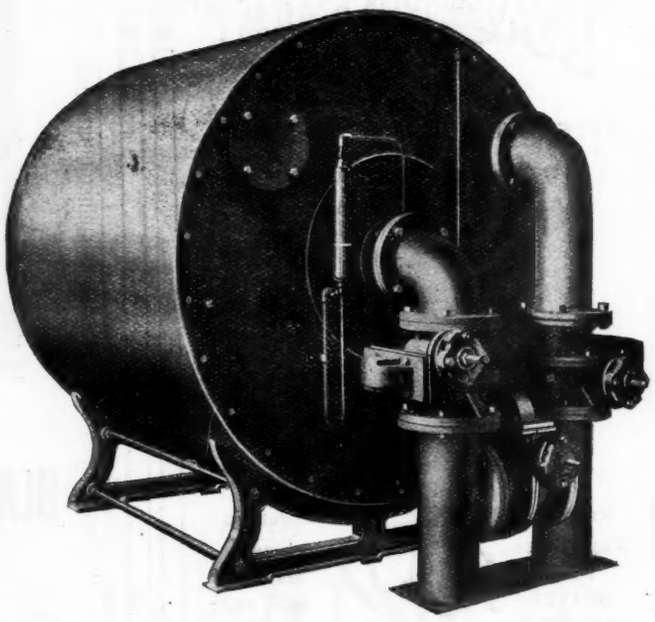
BUILT IN SIZES
TO PASS FROM
600 TO 30,000
CUBIC FEET PER HOUR

QUOTATIONS WITH DRAWINGS & SPECIFICATIONS FURNISHED ON APPLICATION.

Our Station Meters operating in all parts of the world are passing over

$15\frac{3}{4}$ MILLION
Cubic Feet of Gas per hour.

REPEAT ORDERS testify to their HIGH QUALITY

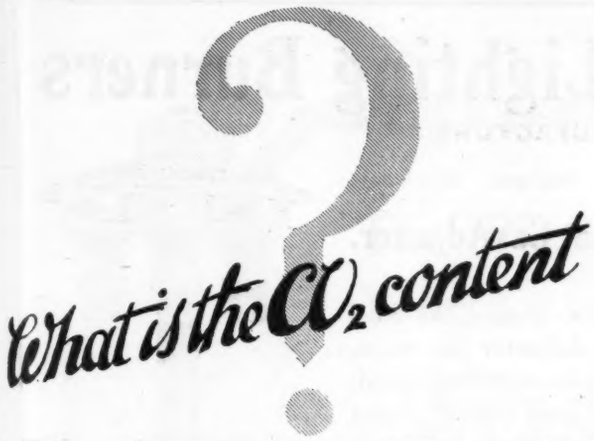


BACK VIEW.

OLDHAM
UNION STREET
Phone: 340
Grams: "Meter, Oldham"

MANCHESTER
18 ATKINSON STREET
Phone: Central 2918
Grams: "Meter, Manchester."

DUBLIN
HANOVER STREET
Phone: 1995
Grams: "Meter, Dublin"



The simple way of knowing

WHAT is the CO_2 Content in the gas you produce? The importance of this question you know---yet could you walk now into the works and, standing by the plant, state definitely and without a moment's hesitation how many feet of CO_2 there are in any given 1,000 feet of gas? You can if you have installed W.R. CO_2 Indicators and Recorders.

W.R. CO_2 Indicators provide the simple way of knowing this important factor. The simplicity of their action is equalled only by the simplicity of reading them.

The degree of vacuum produced through CO_2 being absorbed by an absorbent inside a porous vessel is---briefly---the means adopted in these instruments to gauge the CO_2 Content. All your men have to do is to glance from time to time at the indicator or graph. If this shows a change the necessary correcting action can be taken.

Investigate fully these successful Instruments. Write for descriptive pamphlet giving complete information, and 30-page book giving users' experiences and opinions. They will interest you. A post-card brings them free and without obligation. Write now.

W. R. PATENTS, Ltd.,
Greek Street, LEEDS.

W.R. CO_2 INDICATORS

WRPltd

RIDE & BELL
LIMITED
MISTERTON
VIA DONCASTER.

NEW DESIGN
SEPARATE OR
COMBINED
MACHINES

ORDER
IN
HAND

STOKING MACHINERY

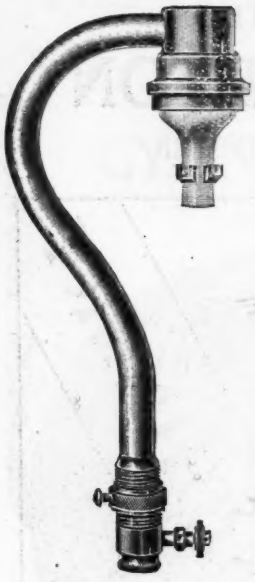
MACHINE MAY BE SHORTLY SEEN AT WORK. MEANTIME SHALL WE SEND YOU FURTHER PARTICULARS?

COMPRESSORS & EXHAUSTERS FOR GAS AND AIR.
See our Advertisement Next Week.
REAVELL & CO. LTD. IPSWICH.

Walter Waugh & Co.
4, LLOYDS AVENUE,
LONDON, E.C. 3.
Telegraphic Address: "Swaltaugh, Fen., London." Telephone: 6650 Avenue (3 lines).
TAR, AMMONIA, AND CYANOGEN PRODUCTS.
PITCH A SPECIALITY.

"Veritas" Street Lighting Burners

(BRITISH MANUFACTURE).



Sound Construction and Highest Efficiency.

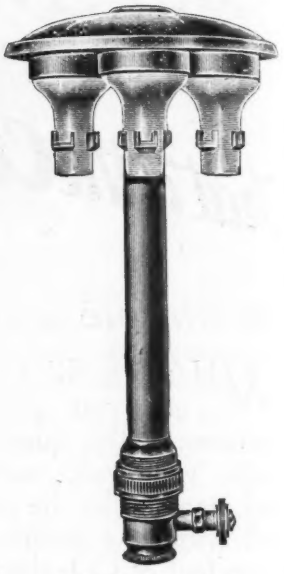
Fitted with New Patent Gas Adjuster.

The "Veritas" Street Lighting Burners are fitted with our **New Patent Gas Adjuster** this season, which enables a gradual Regulation to be effected. The internal mechanism is most efficient against **vibration,** and the adjustment when once made **remains unaffected.**

It is **the best** and the **most reliable** Gas Adjuster yet produced.

Made from 1—5 light and provided with nozzles to take universal fitting, No. 2 or bijou size mantles.

Samples and Prices on application.



G 73722. 1-light. G 73725. 3-light.

Falk, Stadelmann, & Co. LTD.

VERITAS LIGHT WORKS

LONDON · GLASGOW · MANCHESTER · BIRMINGHAM

CASES FOR BINDING QUARTERLY VOLUMES OF THE "JOURNAL."

Price 3s. 6d. each, post free.

LONDON: WALTER KING, LIMITED, 11, Bolt Court, Fleet Street, E.C.4.

ROTARY METERS

are built in units of hourly capacities from

1000 cu. ft. to 1,000,000 cu. ft.

for COAL GAS, COKE OVEN GAS, AIR, &c.

CHEAP IN PRICE. OCCUPY VERY LITTLE SPACE. EASILY CLEANED.

MEASURE THE TOTAL VOLUME OF GAS PASSING.

THE ROTARY METER CO. LTD.

WHITEFIELD, MANCHESTER.

THE

F.C. CONSTRUCTION CO. LTD.

ENGINEERS & CONTRACTORS FOR

FERRO-CONCRETE STRUCTURES

SPECIALISTS IN

GAS WORKS PLANT

TELEPHONE DERBY 1112
TELEGRAMS "REINFORCE DERBY"

OLD BANK CHAMBERS
26 IRON GATE
DERBY

RETORT SETTINGS

WILSON'S (CONT-INT.) VERTICALS

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RENEWALS & NEW BENCHES

GAS-WORKS ERECTED COMPLETE.

R. & G. HISLOP
Underwood House,
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THOMAS BUGDEN & Co.,

India-Rubber and Airproof Manufacturers and General Contractors.
LARGEST MANUFACTURERS OF GAS MAIN BAGS.
Telegrams—"AIRPROOF, ISLING, LONDON." Telephone—748 CITY.

Gas Bags for Repairing Mains.

PATENTEES OF THE **DENMAR BAG.**
Impervious to Main Liquor and Climatic Influences.

Drain Rods and Appliances.

Bellows and Inflators for Inflating Gas Bags.

Round or Cylinder Shape.

CONTRACTORS TO H.M. GOVERNMENT

Oilskin Clothing, Tarpaulins, &c., Tar Hose, Sewer Boots.

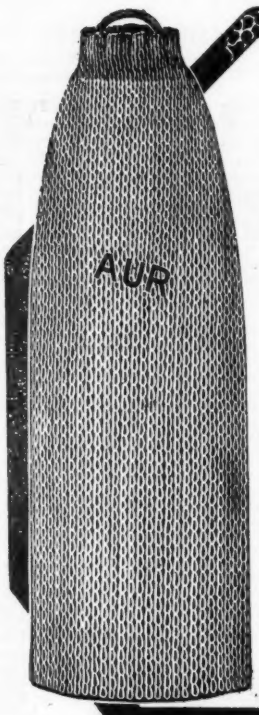
Hose, Tubing, and Sheet of Every Description.

Wading and Well Dresses.

Stokers' Mitts and Gloves.

Contractors' and Miners' Woollen Jackets, Trousers, Hats, &c.

244, Goswell Road, LONDON, E.C.



The Pioneer Mantles of the World--and Still the Best.

WELSBACH

BRITISH MADE

GAS MANTLES

Are the Most Reliable for all Lighting Purposes.

Strong, Brilliant and Reliable, they never fail to give the UTMOST SATISFACTION.

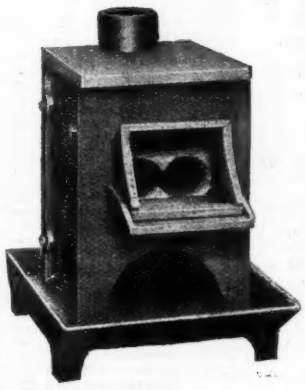
P.P.S 106

Advt. of the Welsbach Light Co., Ltd., Welsbach House, King's Cross, London, W.C.1.

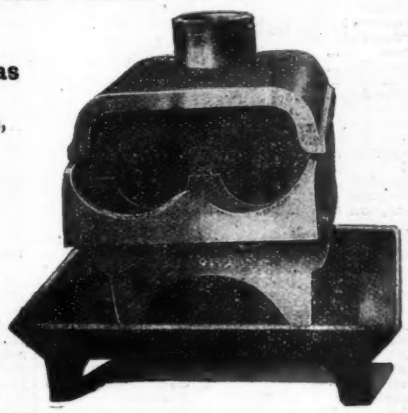
Promote Industrial Economy and Increase Gas Sales by the use of

TILLEY SOLDERING STOVES & INTERNALLY-HEATED BOLTS

LOWEST POSSIBLE CONSUMPTION at either High or Low Pressure.
HEAT CONSERVED BY REGENERATING FLUES.



For **High Pressure Gas**	For **Low Pressure Gas**
No. 1 Size for 2-2lb. bolts, **35/-** each.	For 2-2lb. bolts, **35/-** each.
No. 2 Size for 2-4lb. bolts, **52/6** each.	FIRE-BRICK LININGS.
	No SMELL.



Have Some in your Showroom.

Internally-heated Soldering Bolt (H. or L. Pressure), 22/6 each.

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THE TILLEY HIGH PRESSURE GAS SYNDICATE, LTD.,

Telephone: Hendon 1018. **Brent Works, Hendon, N.W. 4.** *Telegrams: "Tilley, Hendon."*

HUMPHREYS & GLASGOW, LTD.

WATER GAS

	Cu. Ft. Daily
Aarhus	800,000
Abertillery	600,000
Abertillery (2) ...	100,000
Admiralty:	
British	800,000
British (2) ...	800,000
British (3) ...	300,000
British (4) ...	800,000
British (5) ...	800,000
French	600,000
French (2) ...	800,000
Agram	200,000
Airdrie	430,000
Aldershot	1,400,000
Aldershot (2) ...	1,000,000
Alkmaar	400,000
Allenstein	200,000
Alost	700,000
Amersfoort	300,000
Amsterdam	1,000,000
Amsterdam (2) ...	1,000,000
Amsterdam (3) ...	2,700,000
Antwerp	1,500,000
Antwerp (2) ...	1,000,000
Antwerp (3) ...	1,500,000
Ashford	250,000
Asnieres	650,000
Augsburg	425,000
Aylesbury	150,000
Banbury	200,000
Banff	125,000
Barmen	500,000
Barrow	300,000
Barrow (2)	500,000
Barry	500,000
Bath	1,000,000
Bath (2)	1,000,000
Bath (3)	1,300,000
Belfast	1,700,000
Belfast (2)	4,500,000
Belfast (3)	1,250,000
Belfast (4)	1,250,000
Benrath	125,000
Berlin:	
Charlottenburg ...	2,500,000
Danziger Strasse	1,600,000
Neukoelin	650,000
Neukoelin (2) ...	700,000
Schmargendorf ...	760,000
Tegel	3,500,000
Tegel (2)	6,350,000
Tegel (3)	245,000
Bilston	375,000
Bilston (2)	125,000
Birmingham:	
Adderley Street...	675,000
Nechells	3,000,000
Nechells (2) ...	3,000,000
Nechells (3) ...	3,000,000
Swan Village ...	1,500,000
Windsor Street ...	3,000,000
Windsor Street (2)	3,000,000
Bishop's Stortford...	200,000
Bishop's Stortf'd (2)	300,000
Blois	125,000
Blois (2)	125,000
Bochum	530,000
Bognor	100,000
Bo'ness	125,000
Bordentown, N.J. ...	125,000
Boulogne	340,000
Bournemouth ...	1,000,000
Bournemouth (2) ...	500,000
Bournemouth (3) ...	1,500,000
Bournemouth (4) ...	1,000,000
Bournemouth (5) ...	600,000
Bournemouth (6) ...	1,530,000
Bremen	550,000
Bremen (2)	950,000
Bremen (3)	850,000
Brentford	1,200,000
Brentford (2) ...	850,000
Brentford (3) ...	350,000
Brentford (4) ...	750,000
Brentwood	250,000
Brest	550,000
Bridgwater	200,000
Bridlington ...	150,000
Bridlington (2) ...	200,000
Brieg	100,000
Brierley Hill ...	250,000
Brighton	1,750,000
Brighton (2) ...	1,850,000
Brighton (3) ...	750,000
Brighton (4) ...	2,750,000
Bristol	2,000,000
Bristol (2)	2,500,000
Bromley	1,500,000
Bruges	200,000
Bruges (2)	600,000
Brussels:	
Anderlecht ...	350,000
Anderlecht (2) ...	350,000
Forest	1,000,000
Forest (2)	1,000,000
Forest (3)	1,000,000
Forest (4)	1,500,000
Koekelberg ...	1,000,000
St. Gilles	1,000,000
St. Josse	1,000,000

	Cu. Ft. Daily
St. Josse (2) ...	600,000
St. Josse (3) ...	775,000
Ville	750,000
Ville (2)	750,000
Ville (3)	1,500,000
Ville (4)	350,000
Bucarest	1,100,000
Budapest	50,000
Budapest (2) ...	1,750,000
Budapest (3) ...	200,000
Budapest (4) ...	250,000
Caen	250,000
Cambridge	500,000
Cambridge (2) ...	1,000,000
Cardiff	2,000,000
Cardiff (2)	3,000,000
Cardiff (3)	1,950,000
Cardiff (4)	600,000
Carlisle	600,000
Carlsruhe	500,000
Chateauroux ...	125,000
Chateauroux (2) ...	125,000
Châtelet	500,000
Chesterfield ...	430,000
Chesterfield (2) ...	90,000
Chichester	250,000
Chorley	300,000
Cie. des Compteurs—	
Montrouge	1,150,000
Coatbridge	400,000
Commercial, London	850,000
Commercial (2) ...	850,000
Commercial (3) ...	1,250,000
Commercial (4) ...	2,000,000
Commercial (5) ...	800,000
Copenhagen ...	700,000
Copenhagen (2) ...	2,500,000
Copenhagen (3) ...	1,750,000
Courtrai	250,000
Coventry	600,000
Coventry (2) ...	600,000
Coventry (3) ...	800,000
Coventry (4) ...	1,250,000
Cowdenbeath ...	420,000
Cracow	200,000
Cracow (2)	200,000
Crefeld	500,000
Crewe	700,000
Crosfield and Sons	1,500,000
" " (2)	1,500,000
Crowborough ...	150,000
Croydon	1,250,000
Croydon (2)	625,000
Croydon (3)	625,000
Croydon (4)	550,000
Croydon (5)	650,000
Croydon (6)	1,125,000
Deal	250,000
Debreczin	100,000
Derby	1,500,000
Derby (2)	2,000,000
Deventer	150,000
Deventer (2) ...	200,000
Devonport	1,600,000
Doncaster	1,350,000
Dorking	150,000
Dover	500,000
Dublin	2,000,000
Dublin (2)	2,000,000
Dublin (3)	850,000
Dudley	600,000
Dundee	1,500,000
Dunedin, N.Z. ...	150,000
Dunedin (2) ...	275,000
Durham	200,000
Dusseldorf	1,000,000
Eastbourne	1,250,000
Edinburgh	2,000,000
Epsom	225,000
Epsom (2)	300,000
Essen	1,400,000
Essen-Borbeck ...	1,400,000
Falmouth	150,000
Faversham	200,000
Flensburg	300,000
Flensburg (2) ...	125,000
Forst	300,000
Frankenthal ...	175,000
Fuel Research Wks.	500,000
Furnes	500,000
Gablonz	140,000
Gas L. & Coke Co.:	
Beckton ...	10,000,000
Beckton (1910) ...	7,000,000
Beckton (1911) ...	3,500,000
Beckton (1912) ...	7,000,000
Beckton (1919) ...	7,000,000
Beckton (1920) ...	5,250,000
Bow Common ...	1,000,000
Bow Common (2)	1,150,000
Bromley	3,750,000
Bromley (2) ...	2,250,000
Fulham	2,500,000
Fulham (2) ...	1,700,000
Kensal Green ...	2,250,000
Kensal Green (2)	2,250,000
Kensal Green (3)	2,250,000
Nine Elms... ...	2,750,000
Shoreditch ...	900,000

	Cu. Ft. Daily
Shoreditch (2) ...	2,700,000
Stratford	1,700,000
Stratford (2) ...	850,000
Gelsenkirchen ...	175,000
Gelsenkirchen (2)...	350,000
Geneva	500,000
Geneva (2)	700,000
Glasgow	3,000,000
Glasgow (2)	2,500,000
Glasgow (3) ...	2,250,000
Gloucester	800,000
Gosport	200,000
Goteborg	300,000
Goteborg (2) ...	600,000
Graudenz	200,000
Grays	250,000
Grays (2)	400,000
Guildford	350,000
Guildford (2) ...	200,000
Guildford (3) ...	350,000
Haarlem	850,000
Hamburg	1,750,000
Hampton Court ...	500,000
Hampton Court (2)	600,000
Hanley	800,000
Hartlepool	750,000
Hartlepool (2) ...	765,000
Hebden Bridge ...	200,000
Heidelberg	280,000
Hereford	525,000
Hilversum	850,000
Hinckley	250,000
Holyoke, Mass. ...	600,000
Hong Kong	450,000
Hornsey	2,750,000
Hull	1,500,000
Hull (2)	1,000,000
Ilford	650,000
Ilford (2)	750,000
Innsbruck	200,000
Ipswich	750,000
Ipswich (2)	1,250,000
Kampen	350,000
Karlsbad	350,000
Kiel	1,000,000
Kiel (2)	880,000
Kilmarnock ...	500,000
Kirkintilloch ...	360,000
Kolozvar	100,000
Lancaster	500,000
Lausanne	250,000
Lausanne (2) ...	385,000
Lawrence, Mass. ...	400,000
Le Mans	420,000
Lea Bridge	350,000
Lea Bridge (2) ...	350,000
Lea Bridge (3) ...	400,000
Lea Bridge (4) ...	1,000,000
Lea Bridge (5) ...	1,500,000
Lea Bridge (6) ...	1,530,000
Leamington ...	600,000
Leamington (2) ...	525,000
Leeds	1,500,000
Leeuwarden ...	400,000
Leiden	500,000
Leiden (2)	575,000
Leigh	350,000
Lemberg	260,000
Lemberg (2)	500,000
Liége	1,000,000
Liége (2)	750,000
Lille	860,000
Lincoln	500,000
Liverpool	3,500,000
Liverpool (2) ...	4,500,000
Liverpool (3) ...	750,000
Liverpool (4) ...	1,750,000
Liverpool (5) ...	1,250,000
Liverpool (6) ...	3,000,000
Liverpool (7) ...	1,500,000
Liverpool (8) ...	1,250,000
Long Eaton ...	430,000
Longton	600,000
Louvain	800,000
Lubeck	400,000
Luton	400,000
Maastricht	200,000
Macclesfield ...	800,000
Magdeburg	1,400,000
Maidenhead ...	225,000
Maidenhead (2) ...	225,000
Maidenhead (3) ...	175,000
Maidenhead (4) ...	175,000
Maidstone	500,000
Maidstone (2) ...	500,000
Malines	500,000
Malines (2)	575,000
Malmö	350,000
Malta	400,000
Manchester	3,500,000
Manchester (2) ...	3,500,000
Manchester (3) ...	1,500,000
Mansfield	330,000
Marlborough ...	100,000
Mayence	700,000
McKeesport, Pa. ...	500,000
Merthyr Tydfil ...	300,000
Merthyr Tydfil (2)	200,000
Middlesbrough ...	1,250,000

	Cu. Ft. Daily
Middlesbrough (2)..	750,000
M/M. Woolston ...	9,000,000
Monaco	275,000
Mons	500,000
Moscow	1,000,000
Munich	1,400,000
Namur	175,000
Narbonne	350,000
Nelson	400,000
Neuss	140,000
Newburgh, N.Y. ...	600,000
Newbury	250,000
Newcastle, N.S.W....	500,000
New York	5,200,000
Nictheroy	250,000
N. Middlesex ...	150,000
N. Middlesex (2) ...	200,000
N. Middlesex (3) ...	75,000
N. Middlesex (4) ...	650,000
N. Middlesex (5) ...	650,000
N. Middlesex (6) ...	1,000,000
North Sydney ...	500,000
North Sydney (2) ...	500,000
Norwich	1,000,000
Norwich (2) ...	300,000
Norwich (3) ...	500,000
Norwich (4) ...	1,500,000
Nottingham ...	1,000,000
Nottingham (2) ...	1,000,000
Nuneaton	125,000
Oberhausen ...	175,000
Oldbury	500,000
Oldenburg	200,000
Ormskirk	170,000
Ostend	100,000
Ostend (2)	200,000
" Zandvoorde	700,000
Paris:	
Landy	5,400,000
Villette	3,600,000
Clichy	3,600,000
Pau	550,000
Pembroke	240,000
Perigueux	350,000
Perth, W.A.	125,000
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Poitiers	350,000
Pontypool	120,000
Port Elizabeth ...	400,000
Portsmouth	1,000,000
Portsmouth (2) ...	2,000,000
Portsmouth (3) ...	800,000
Posen	450,000
Posen (2)	700,000
Prague	140,000
Preston	1,400,000
Ramsgate	430,000
Reading	1,000,000
Reading (2)	1,000,000
Redditch	500,000
Redhill	275,000
Redhill (2)	300,000
Reichenberg ...	200,000
Reichenberg (2) ...	200,000
Reval	350,000
Rhymney	175,000
Rhymney (2) ...	250,000
Ripley	120,000
Rochester	2,200,000
Romford	300,000
Romford (2)	350,000
Rotterdam	850,000
Rotterdam (2) ...	1,500,000
Rotterdam (3) ...	750,000
Rotterdam (4) ...	750,000
Rotterdam (5) ...	600,000
Rotterdam (6) ...	2,000,000
Royston (Yorks.) ...	250,000
Rugby	1,000,000
Rushden	425,000
St. Albans	700,000
St. Andrews ...	210,000
St. Gallen	225,000
St. Gallen (2) ...	225,000
St. Joseph	750,000
Sté. Chim. de la Cr. Paroisse ...	1,320,000
San Paulo	700,000
Santiago, Cuba ...	400,000
Scarborough ...	800,000
Scarborough (2) ...	200,000
Scarborough (3) ...	350,000
Scarborough (4) ...	1,300,000
Seaford	200,000
Shanghai	225,000
Shanghai (2) ...	225,000
Shanghai (3) ...	1,600,000
Sheerness	200,000
Sheerness (2) ...	180,000
Sheffield	1,530,000
" Steel Prods.	5,000,000
Shrewsbury ...	300,000
Southall	2,000,000
Southall (2) ...	2,000,000
Southampton ...	800,000
Southampton (2) ...	500,000
Southampton (3) ...	600,000
Southampton (4) ...	100,000
Southampton (5) ...	1,000,000

	Cu. Ft. Daily
Southend	1,250,000
Southend (2) ...	900,000
Southend (3) ...	900,000
Southgate	400,000
Southgate (2) ...	500,000
Southgate (3) ...	800,000
Southport	750,000
Southport (2) ...	900,000
Southport (3) ...	700,000
South Shields ...	650,000
South Shields (2) ...	1,250,000
Stafford	500,000
Staines	600,000
Stettin	880,000
Stirling	400,000
Stockholm	1,500,000
Stockholm (2) ...	1,750,000
Stockport	600,000
Stockport (2) ...	600,000
Stockport (3) ...	400,000
Stockport (4) ...	400,000
Stockton	500,000
Stockton (2) ...	250,000
Stourbridge ...	500,000
Stourbridge (2) ...	500,000
Sunderland ...	2,250,000
Swansea	750,000
Swansea (2) ...	1,000,000
Swansea (3) ...	450,000
Swansea (4) ...	1,250,000
Swindon	300,000
Swindon (2)	450,000
Sydney	1,000,000
Sydney (2)	1,000,000
Sydney (3)	1,000,000
Sydney (4)	1,000,000
Syracuse, N.Y. ...	850,000
Taunton	225,000
Taunton (2) ...	350,000
The Hague	1,000,000
The Hague (2) ...	500,000
The Hague (3) ...	1,750,000
Tilburg	400,000
Tirlemont	120,000
Tokyo	2,000,000
Torquay	350,000
Torquay (2)	350,000
Torquay (3) ...	320,000
Tottenham	750,000
Tottenham (2) ...	750,000
Tottenham (3) ...	350,000
Tottenham (4) ...	1,000,000
Tottenham (5) ...	1,000,000
Tottenham (6) ...	1,250,000
Tottenham (7) ...	2,500,000
Tottenham (8) ...	1,000,000
Tournai	700,000
Tours	550,000
Trowbridge	250,000
Tunbridge Wells ...	1,000,000
" " (2)	1,000,000
Tunis	175,000
Tynemouth	1,100,000
Ulm	400,000
Utrecht	1,000,000
Utrecht (2)	1,000,000
Verviers	1,000,000
Vienna	3,500,000
Vienna (2)	2,500,000
Walsall	750,000
Waltham	400,000
Waltham (2) ...	140,000
Wandsbek	125,000
Wandsworth ...	1,800,000
Warwick	125,000
Wasmuel	500,000
Watford	300,000
Watford (2) ...	350,000
Watford (3) ...	400,000
Wath	430,000
Weimar	100,000
Wellingborough ...	525,000
Wellingborough (2)	525,000
Wellington, N.Z. ...	350,000
West Bromwich ...	550,000
Westgate	250,000
Weston-Mare ...	350,000
Weston-Mare (2) ...	350,000
Weston-Mare (3) ...	150,000
Weston-Mare (4) ...	150,000
Wexford	100,000
Weymouth	400,000
Weymouth (2) ...	100,000
Widnes	500,000
Wiesbaden	850,000
Winchester	225,000
Winchester (2) ...	125,000
Winchester (3) ...	410,000
Woking	400,000
Wolverhampton ...	1,500,000
Wolverhampton (2)	1,000,000
Wolverhampton (3)	250,000
Worthing	525,000
Yarmouth	500,000
Yeovil	340,000
Zwolle	200,000
Zwolle (2)	200,000
Zwolle (3)	700,000

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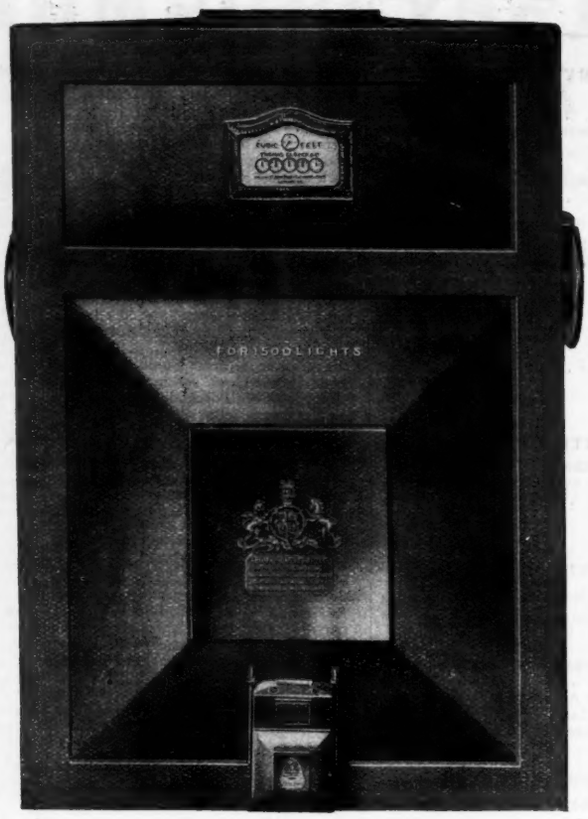

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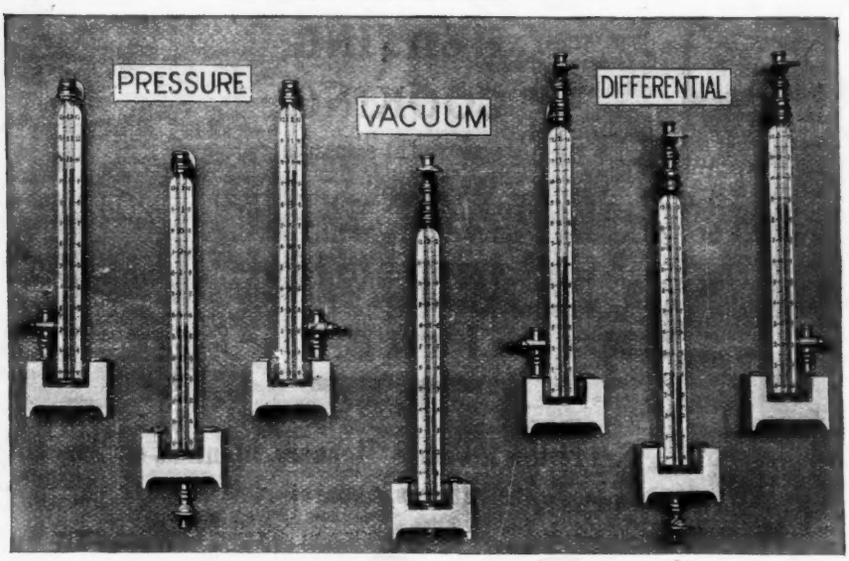

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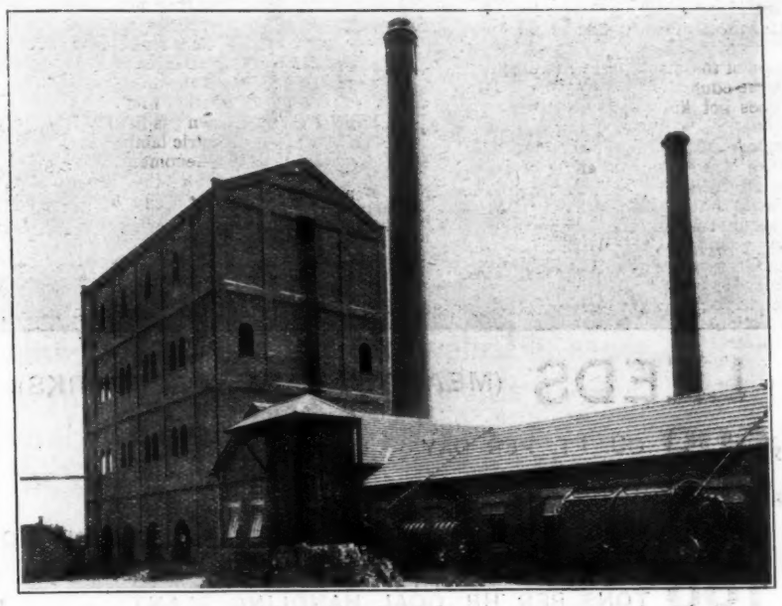

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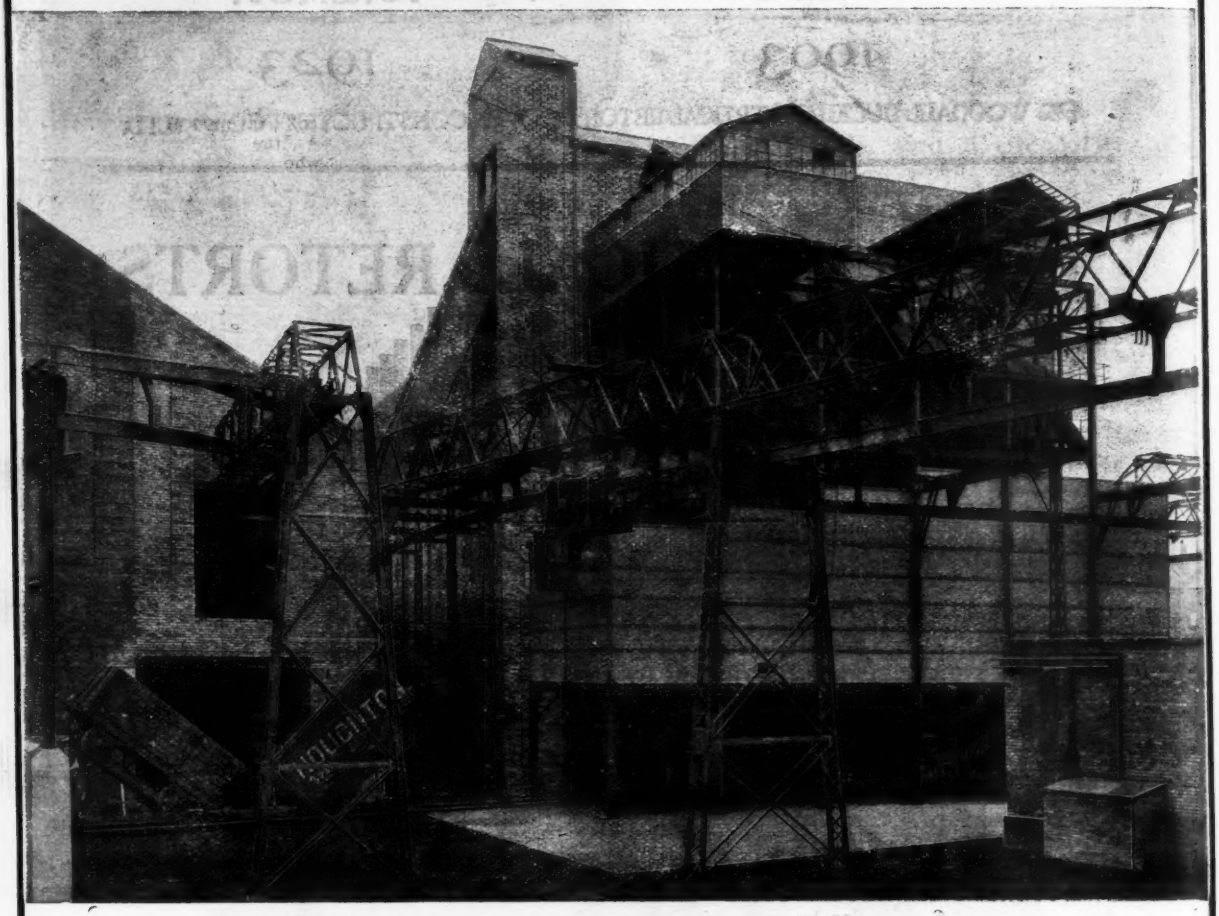

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of the

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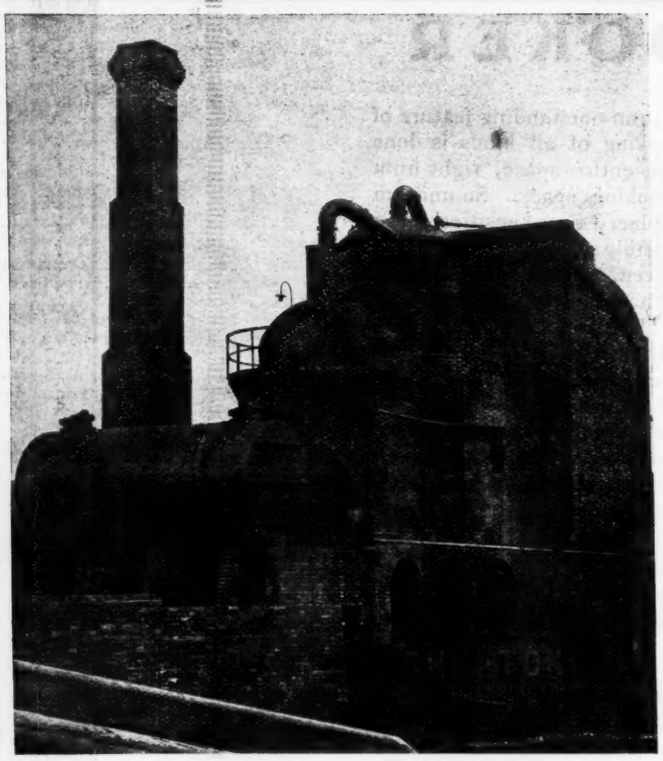

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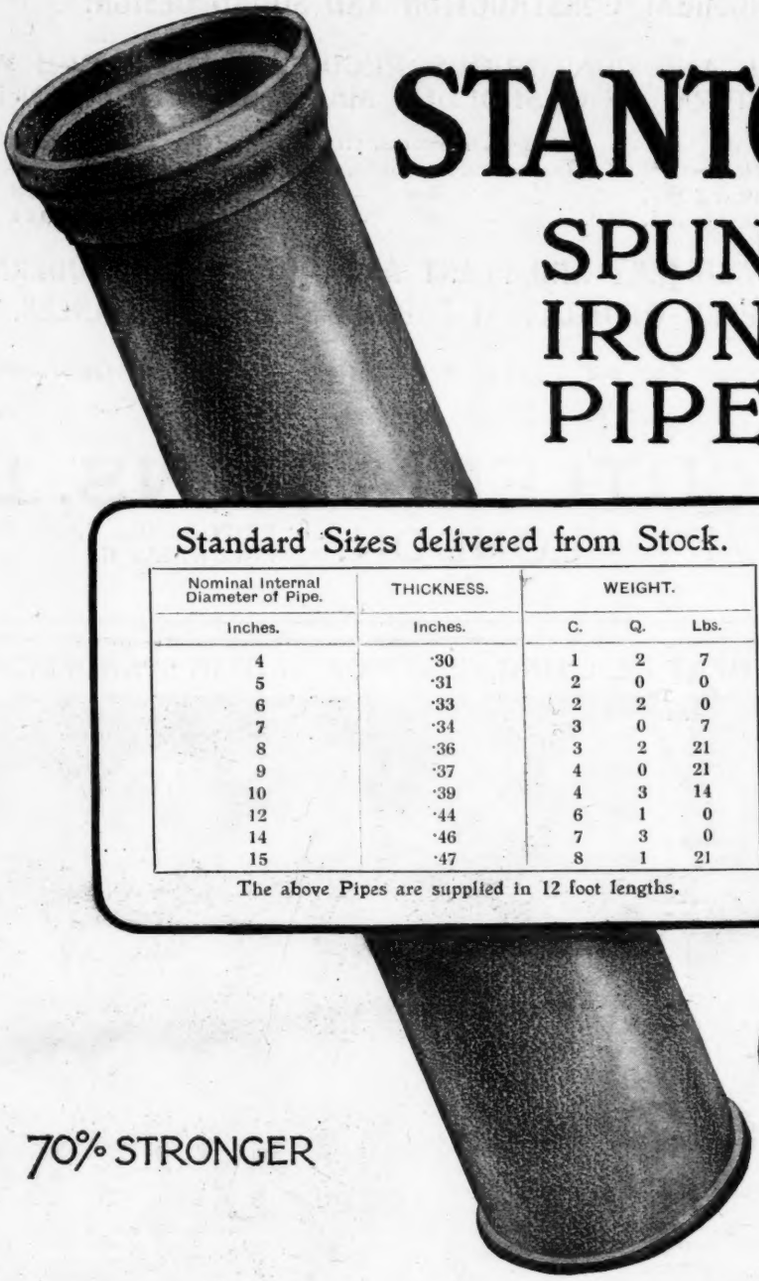

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8	·36	3	2	21
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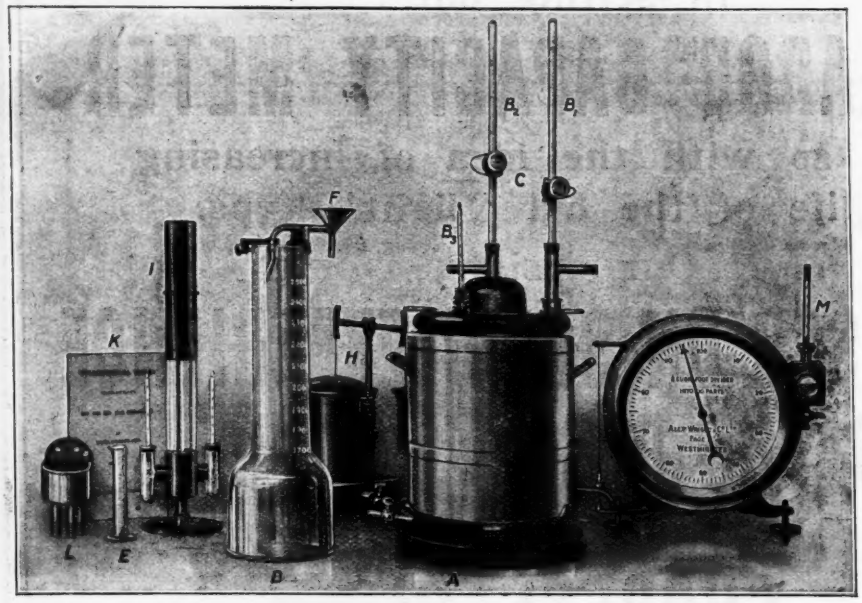

GAS REGULATION ACT, 1920.

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FOR SALE—Steam Engine and Exhauster, capacity 45,000 cubic feet per hour. Exhauster, Waller 4-blade Converted type with 10 in. Screw-Down Gas Valves. Steam Engine, 7¾ in. diameter by 11 in. stroke. Plant Complete with Hydraulic Steam Regulator.
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Engineer and General Manager.
Gas Works,
Stretford.

FOR SALE—Two Million Livesey WASHER with 20-in. Connections Complete, in perfect order, and little used. Removed to make room for other plant. Drawing forwarded if desired. Price, £150 f.o.r., or near offer.
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CONTRACTS OPEN.

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(GAS DEPARTMENT.)

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THE Corporation invite Tenders for the following:
CONTRACT No. 10.—Alteration and extensions to Carbonizing PLANT, consisting of Ten Beds of Eight Retorts in each 20 ft. long, together with all Iron Work, and Coal Handling Plant.
CONTRACT No. 11.—One three Tier Combined Stoking Machine for Charging and Discharging Retorts.
Conditions, Specification, and Plans will be supplied on Application to the undersigned, and will only be sent upon receipt of a Deposit of £2 Treasury Notes, which will be returned on receipt of a *bona-fide* Tender and the return of all Plans and Documents.
Sealed Tenders to be forwarded to E. B. Sharpley, Esq., Town Clerk, Town Hall, Stoke-on-Trent, not later than 12 noon on Monday, July 9, 1923, and endorsed "Tender for..... Contract No....."
The Corporation do not bind themselves to accept the lowest or any Offer.
A. MACKAY,
Chief Engineer and General Manager.
Gas Works,
Etruria,
Stoke-on-Trent,
June 19, 1923.

COMPANY NOTICES.

WANDSWORTH, WIMBLEDON, AND EPSOM DISTRICT GAS COMPANY.

NOTICE is Hereby Given that the TRANSFER BOOKS of the Company, so far as they relate to the FIVE PER CENT. PREFERENCE STOCK and the ORDINARY STOCKS (*i.e.*, Wandsworth "A," "B," "C," Wimbledon, Epsom, and New Ordinary), WILL BE CLOSED from the 3rd to the 16th July proximo (both days inclusive), and Dividends to the 30th of June instant as may be payable in respect thereof will be paid to the persons registered at the date of closing.
By order,
CHAS. W. BRAINE,
Secretary.
Chief Office:
Fairfield Street,
Wandsworth, S.W. 18.
June 21, 1923.

COMMERCIAL GAS COMPANY.

NOTICE is Hereby Given that the TRANSFER BOOKS of this Company, SO FAR AS THEY RELATE TO CAPITAL STOCKS, WILL BE CLOSED from the 7th of July to the 6th of August, both days inclusive, and that Dividends in respect of the half year ending 30th of June, 1923, will be paid on the 15th of August next to the holders of Stock registered at the date of the closing.
By order of the Board,
F. J. BRADFIELD,
Secretary.
Offices: Stepney, E. 1,
June 14, 1923.

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Specialists in Gas Coal and Cannel.
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Three	30	0	× 9	3	× 120	6019/20 & 6027.
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One	30	0	× 7	6	× 180	5967.
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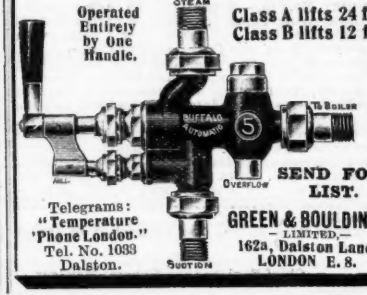

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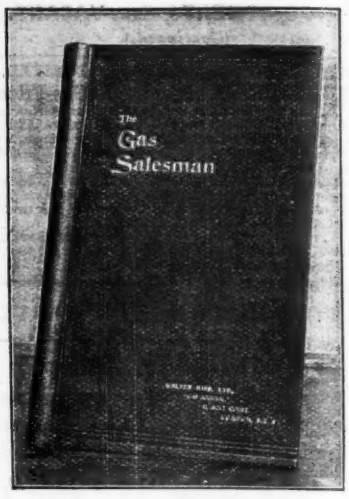

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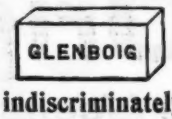
TRADE 

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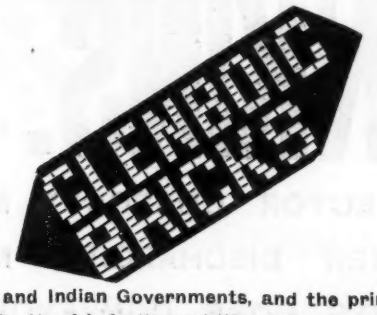

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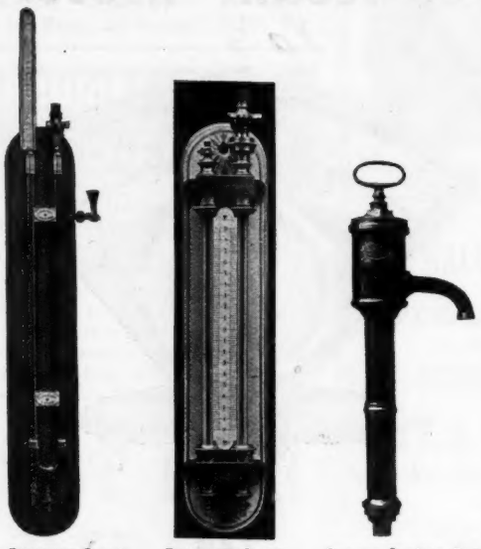

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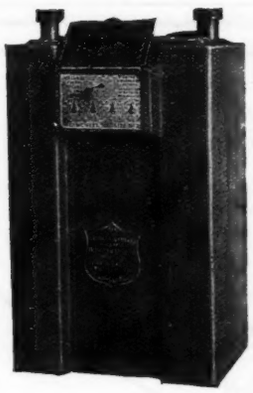

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Fig. 703. "SINGLE RAM" STEAM-PUMP.

Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

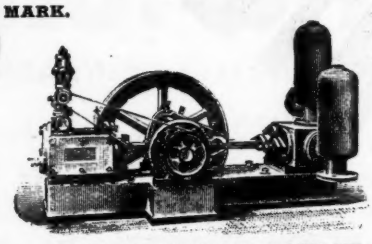

Fig. 685. "RELIABLE" STEAM PUMP FOR TAR AND THICK FLUIDS.

Fig. 712. "DOUBLE-RAM" STEAM-PUMP.

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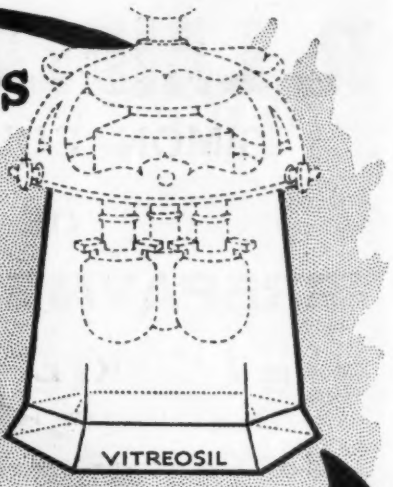

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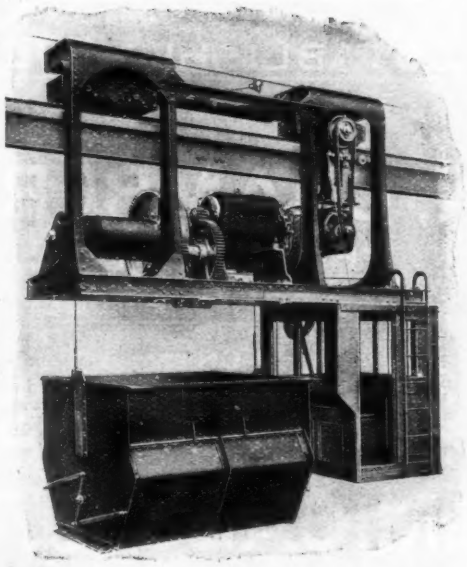

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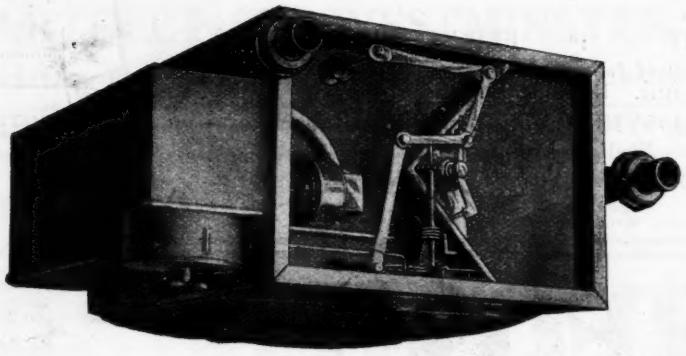

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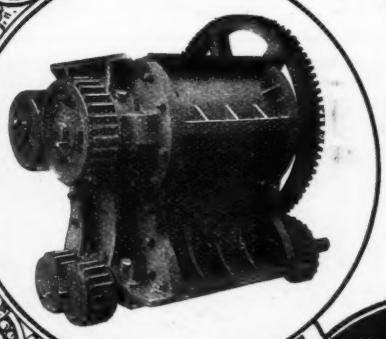

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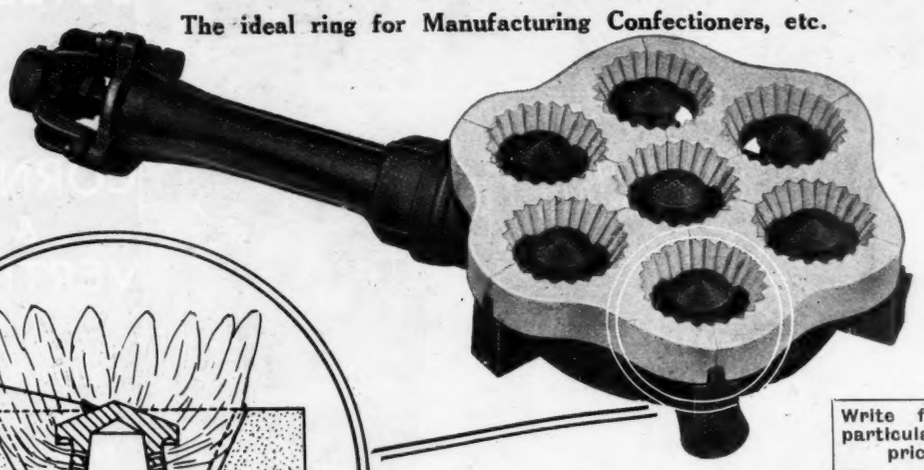

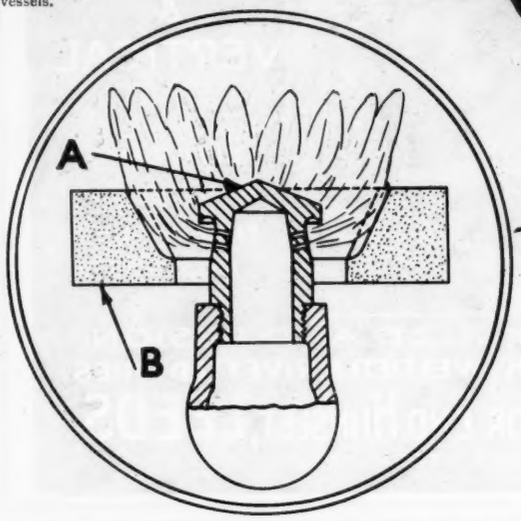

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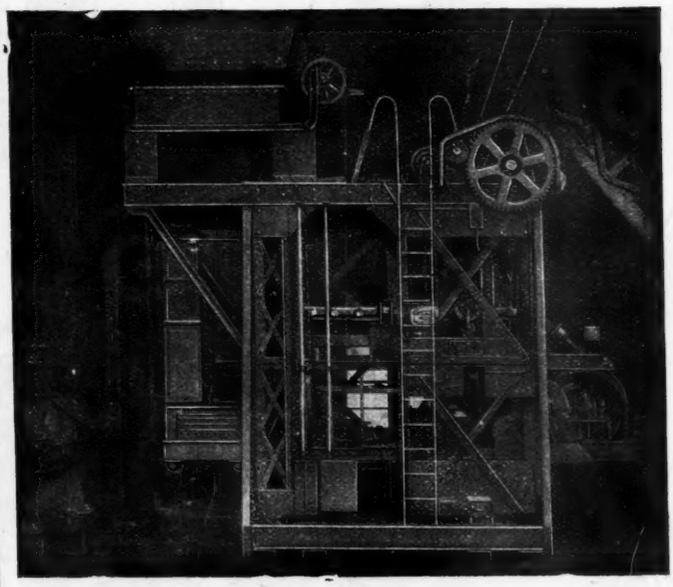

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